guide to NIH PROGRAMS and AWARDS

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FOREWORD

The mission of the National Institutes of Health is to improve the health of the American people through the conduct, encouragement, and support of health research and development and related activities. In pursuit of this goal, the NIH supports about 37 percent of U.S. medical research and development, and provides about 63 percent of all Federal funds for health research. This significant contribution to the nation's attack on diseases which jeopardize the health and reduce the quality of life for millions of people each year, is accomplished principally through grant and contract awards to academic and other health research institutions, to conduct research and development, develop research specialists, and improve the nation's biomedical communications systems.

NIH contributions to and support of research and development in the health sciences have led to improved techniques for the prevention, treatment, and control of heart diseases, cancers, cerebrovascular diseases, infectious diseases, and many others. New insights have been gained into the fundamental processes of life, the functioning of biological systems, the causes of many diseases and degenerative processes, and the prerequisites for good health—insights which provide a basis for the further advance of medical science and practice.

Yet, with the continuing discovery of new knowledge, new health problems have been identified, and others yet unsolved require a renewed effort. The nature of these problems and the demand they place upon the further advance of knowledge and technical capability, to the extent that scientific opportunities exist, are major forces shaping the programs of NIH. About 85 percent of the NIH budget each year supports projects and activities in primarily non-Federal organizations and institutions, conducted under grant or contract awards.

This publication is a compendium of the scientific programs of the entities which make up the National Institutes of Health, and which award such contracts and grants. It replaces the earlier Guide to Grant and Award Programs (National Institutes of Health DHEW Publication No. (NIH) 73-33), and reflects current areas of emphasis and identifies the special interests of each research Institute and Division at the NIH, and the National Library of Medicine. It is also intended to serve as a guide to potential applicants in locating congruent areas of interest and the appropriate NIH offices to contact for further information about application, review, and award processes, and other requirements. We are pleased to present this information to the scientific community and the general public.

Thomas E. Malone, Ph.D.
Associate Director for Extramural
Research and Training

Leon Jacobs, Ph.D.
Associate Director for
Collaborative Research

CONTENTS

FOREWORD 3

I. AWARD MECHANISMS

A. Grants
1. Research Project Grants 6
2. Program Project Grants 7
3. Center Grants 7
4. Resource Grants 7
5. Research Career Development Awards . 7
6. Institutional Grants for National Research Service Awards 7
7. Individual National Research Service Awards 8

B. Research and Development Contracts ... 8

II. PROGRAMS OF NIH INSTITUTES AND DIVISIONS

A. National Institute on Aging 11
B. National Institute of Allergy and Infectious Diseases 12
C. National Institute of Arthritis, Metabolism and Digestive Diseases 18
D. National Cancer Institute 20
E. National Institute of Child Health and Human Development 26
F. National Institute of Dental Research ... 32
G. National Institute of Environmental Health Sciences 37
H. National Eye Institute 40
I. National Institute of General Medical Sciences 43
J. National Heart and Lung Institute..... 47
K. National Institute of Neurological and Communicative Disorders and Stroke.... 51
L. Division of Research Resources 55
M. National Library of Medicine 58
N. Fogarty International Center for Advanced Study in the Health Sciences 59

AWARD MECHANISMS

The National Institutes of Health relies on two major mechanisms, the grant and the contract, as the instruments for accomplishing its program goals through the efforts of scientists outside the NIH.

Although the choice of award mechanism is secondary to the determination of scientific or technical program purposes, careful selection of the mechanism is essential to fix responsibility to the public for the proper use of funds, and to establish clearly the most appropriate working relationships between the NIH and non-Federal participants in NIH programs. Once specific scientific program objectives have been established for an NIH program, reflecting public policy and scientific opportunities as perceived by those working in the particular fields involved, the award mechanism or mechanisms to be used for developing the program through projects and activities will be determined. The major mechanisms used by the NIH are described to the following sections.

GRANTS

Grants for the support of research or related projects or activities make up the largest category of support provided by the National Institutes of Health. These grants encourage and support meritorious projects or programs in all fields related to health, including both basic and applied research, molecular and cellular studies as well as clinical studies, demonstrations and new medical technologies, and certain special resources or facilities for such research. Grants may be awarded to public and private nonprofit organizations and institutions which sponsor and conduct biomedical research and development, including universities, medical and other health schools, colleges, hospitals and research institutes. Grants may provide funds for reasonable costs of the activity, as justified in the application, recommended by expert advisors to the NIH who review the proposals as described below, and approved by NIH staff. Application kits for the grant mechanisms listed below may be obtained from the Division of Research Grants, National Institutes of Health, Bethesda, Maryland 20014, or from the specific Institute or Division of interest. The information provided describes allowable costs for which support may be requested, and instructs the applicant on other steps in the process.

Grant applications submitted to the NIH are reveived by the Division of Research Grants and are subjected to a peer review process. In DRG the applications are numbered, and assigned by the Referral Branch to the appropriate Institute(s) for potential award of approved applications after completion of review, and to a scientific or technical advisory group, often a DRG study section, for review for scientific and technical merit. NIH public advisory groups are listed in the semiannual publication *NIH Public Advisory Groups*, which identifies advisory group members and the functions of each committee. Single copies of this publication are available from the NIH Committee Management Office upon request.

Once reviewed for merit, grant applications and the recommendations of the scientific/technical merit review group are referred for final review to the National Advisory Council or Board of the Institute(s) or Division to which the application has been assigned. NIH staff will award grants from among those applications recommended for approval by the Advisory Council. Taken together, the initial review for scientific and technical merit, and the second review both for merit and for significance to a particular Institute's programs and objectives, constitute the NIH "dual review process' for grant applications.

Research Project Grants: These grants are awarded to an institution on behalf of a principal investigator, for a discrete research project in the area of an investigator's interest and competence, with a single scientific focus or objective.

Any individual is eligible to apply for research grant support provided his institution officially sponsors his application. Such sponsorship assures the NIH that the institution will provide facilities necessary to accomplish the research goals and accept responsibility for judicious use and accountability for grant funds awarded. Rarely, a research grant may be awarded directly to an individual with adequate facilities and resources for conducting the research.

Applications are eligible in all areas of health-related research and development, with special emphasis on the programs described in this compendium, with the exception of requests for:

- support of clinical projects or activities which have only a limited research component;
- equipment, or for alteration or renovation of laboratory space, when not requested for conduct of a specific research project;
- grants exclusively for travel to meetings or conferences, except those from scientific or professional societies or similar responsible organizations.

Although there is no precise limitation on the number or dollar amount of research grants that may be awarded to any one institution or in behalf of any one investigator, the ability of a scientist to devote adequate time to the project, whether or not his salary comes from the grant, is related to its potential and is a factor in the review of the application.

Applicants must provide detailed information to justify their proposals, including an adequate description of the research plan, the general objectives and specific aims of the proposal, the methods of procedure, the significance of the proposed research, the available facilities, previous work by others, and a budget estimate with adequate justification of individual items. Further instructions are included in the research grant application kit (Form NIH 398).

Program Project Grants are awarded to an institution in behalf of a principal investigator for the support of a broadly based, often multidisciplinary, long-term research program which has a specific major objective or basic theme. A program project generally involves the organized efforts of groups of investigators, members of which conduct research projects related to the overall program objective. The grant can provide support for the projects and for certain basic resources shared by individuals in a program where the sharing facilitates the total research effort. Each project supported under a program project grant is expected to contribute to and be directly related to the common theme of the program; the projects should demonstrate an essential element of unity and interdependence.

Center Grants are all awarded to institutions in behalf of a program director and a group of collaborating investigators and may support long-term multidisciplinary programs of research and development. They can support programs in critical health problem areas and include research and development, demonstration of advanced techniques for the diagnosis, treatment, prevention, or control of disease, education, and other related non-research components. The grant may support the projects and activities as well as "core" or shared resources; or, within the specifications of a particular NIH program, *only* the "core" costs may be provided under the center grant, with project support to be requested through the project grant or program project mechanisms. These grants differ from program project grants in that they are usually developed in response to specific announcements of the programmatic needs of an NIH Institute or Division, with specific requirements developed to meet these needs. The staff of the appropriate NIH Bureau, Institute or Division should be consulted before a center grant application is submitted to the NIH for review.

Resource Grants: These special purpose grants are awarded to support research resources, such as computer centers, or General Clinical Research Centers, available to all qualified biomedical investigators without regard to the scientific disciplines or disease orientations of their research activities. Generally, the resources serve a wide range of biomedical research problems but may be oriented toward serving specific research needs. Such awards do not serve to support the research programs of only a single disease or problem area or NIH Institute. (See programs of Division of Research Resources.)

Research Career Development Awards are provided to foster the early development of scientists who have outstanding research potential for careers of independent research in the sciences related to health. Awards are made to research and academic institutions to provide all or part of the salary of the awardee, based on training, experience, and demonstrated potential for health-related research productivity.

Institutional Grants for National Research Service Awards: A domestic public or nonprofit private institution may apply for a grant to support a training program in a specified area of research from which a number of awards will be made to individuals selected by the institution and the training program director. Support for both pre- and postdoctoral trainees may be requested.

The applicant institution must have, or be able to develop, the staff and facilities required for the proposed program. The training program director at the institution will be responsible for the selection and appointment of trainees to receive National Research Service Awards and for the overall direction of the program.

Predoctoral trainees must have received an appropriate baccalaureate degree as of the date of appointment to the approved training program. An individual at the postdoctoral level must have received as of the date of the appointment to the approved training program a Ph.D., M.D., D.D.S., D.O., D.V.M., O.D., D.P.M., Sc.D, D. Eng., D.N.S., or equivalent domestic or foreign degree.

The stipend level for predoctoral trainees is $3,900 per annum. The stipend level for postdoctoral trainees is determined by the number of years of relevant postdoctoral experience at

the time of appointment in accordance with the schedule established for Individual National Research Service awardees (see below). There is no allowance for dependents.

In addition to stipends, the applicant institution may request tuition, fees, and travel costs for trainees; actual indirect costs or 8% of allowable direct costs, whichever is less; and up to 25% of the total award for related institutional costs such as salaries, equipment, supplies, etc.

Institutional grants may be made for project periods of up to five years and may be renewable. However, no individual may receive more than three years of support in the aggregate from a National Research Service Award, except as waived by regulations.

Upon completion of their training under the program, recipients of NRS Awards are expected to engage in biomedical research or teaching for a period equal to the period of support. From individuals who fail to fulfill their full service obligation, the United States is entitled to recover an amount equal to the stipend received from the NIH plus interest in accordance with a formula which gives one-half credit to months actually served in the computation of the payback debt.

NRS Awards will be made for research training only in the research areas which are specified by the National Academy of Sciences as needing research personnel and which will be announced annually by the NIH.

Individual National Research Service Awards may be made to individual postdoctoral applicants for research training in specified areas of science. Awardees are selected as a result of national competition. Prior to application each applicant must arrange for acceptance by a sponsor and by an appropriate institution or a unit of NIH that has the staff and facilities suitable to provide the proposed training. The major emphasis of the application must be the training experience and broadening of scientific competence to be gained.

An individual as of the beginning date of the proposed training program must have received a professional or scientific doctoral degree, such as the M.D., Ph.D., D.D.S., D.O., D.V.M., Sc.D., D. Eng., D.N.S., O.D., D.P.M:, or equivalent domestic or foreign degree.

Applicants must be citizens or noncitizen Nationals of the United States or have been lawfully admitted to the United States for permanent residence *at the time of application.*

Although NRS Awards are made for 12-month periods, assurance may be given by the awarding unit for continued support beyond the first year to a maximum of 3 years, provided that progress is satisfactory and funds are available.

Upon completion of the program, recipients of NRS Awards are required to engage in biomedical research or teaching for a period equal to the period of support. From individuals who fail to fulfill their full service obligation, the United States is entitled to recover an amount equal to the stipend received from the NIH plus interest in accordance with a formula which gives one-half credit to months actually served in the computation of the payback debt.

The annual stipend level is determined by the number of years of relevant postdoctoral experience. Research experience (including industrial, teaching, internship, residency, etc.) may be considered relevant experience.

Years of Relevant Experience at Time of Initial Award	Current and Subsequent Years of Award		
	1st Year	2nd Year	3rd Year
0	$10,000	$10,400	$10,800
1	10,800	11,200	11,600
2	11,500	11,900	12,300
3	12,200	12,600	13,000
4	12,800	13,200	13,600
5 or more	13,200	13,600	14,000

Upon request, non-Federal sponsoring institutions will receive an institutional allowance of up to $3,000 per annum for each trainee. This allowance is to help defray such expenses for the trainee as tuition and fees, research supplies and equipment, travel to scientific meetings, medical insurance, and other costs incurred relating to the award.

NRS Awards will be made for research training only in the research areas which are specified by the National Academy of Sciences as needing research personnel and which will be announced annually by the NIH.

RESEARCH AND DEVELOPMENT CONTRACTS

Building beyond the base of knowledge, manpower, and resources developed under grant support, the National Institutes of Health, their advisors, and their constituencies of scientists and institutions have recognized needs for further steps to satisfy requirements for their disease-and health-oriented missions. Such requirements create needs for the NIH to:

stimulate and direct scientific inquiry towards new areas of research and development, by identifying and exploiting specific ideas and opportunities bearing upon

specified categorical problems; and

exploit advances in biomedical knowledge and technology through deliberately organized efforts, aimed at disease or other health problems or urgent needs, and seeking defined answers, results, or products with a high probability of accomplishment.

When such projects are conducted by non-Federal organizations with close NIH monitoring and direction or control, they are accomplished under contract awards. Because of the collaboration inherent in such efforts, between NIH and contractor organizations and investigators, NIH has characterized such projects as "collaborative" R&D.

Research—Some NIH contract efforts focus towards a practical use of knowledge to meet recognized needs constituting part of an NIH mission, and where NIH has identified a specific research problem requiring central direction, control, and management, as in approaches to:

—search for specific chemotherapeutic mechanisms against cancers;
—explore the efficacy of regimens to control heart attacks; or
—characterize immunological phenomena to extend organ transplant capabilities.

Development—Other NIH contracts are awarded for projects which use the knowledge and understanding gained from research towards creating useful substances, devices, systems, or other approaches to diagnose prevent, treat, or control diseases, including development of:

—vaccines or drugs effective against disease conditions;
—medical devices to assist or replace organ functions; or
—sophisticated instruments to refine laboratory or clinical procedures.

Demonstration—Recent developments in some NIH programs have led to opportunities to demonstrate the feasibility of applying these advances to individual or community situations to solve certain health problems. Where closely controlled or directed by the NIH these activities are also conducted under contract awards.

R&D Support—NIH programs occasionally identify requirements for certain types of resources or services to support ongoing R&D activities. When specific requirements and approaches may be defined for these projects, contracts are awarded, such as for:

—research services, e.g., data processing, drug testing, toxicology screening, or management services; and
—research resources, e.g., collection and distribution of materials needed to conduct biomedical R&D, or development of sophisticated equipment or facilities for access by many investigators.

NIH research, development, demonstration, and R&D support contracts are awarded to nonprofit and commercial organizations, using the negotiated method of procurement, which affords the contracting parties maximal flexibility to establish, define, and agree on parameters of the contract work scope and anticipated costs. Most NIH R&D contracts are of the cost-reimbursement variety, under which NIH pays the contractor all reasonable, allocable, and allowable costs incurred in performance of the project. In addition, fees may be paid to commercial organizations.

NIH R&D contract requirements are advertised as widely as possible, to seek participation from all segments of the scientific community where expertise may exist to perform the specified work. Such solicitations are conducted always through the COMMERCE BUSINESS DAILY, subscriptions to which are available from the Superintendent of Documents, Government Printing Office, Washington, DC 20402. Announcements are generally published also in Supplements to the NIH Guide for Grants and Contracts, which also occasionally carries more generalized descriptions of NIH contracting activities. Some specific project solicitations appear in general or specialized scientific or medical journals or other media. In addition, potential contractors are occasionally invited to submit statements of their interest and capabilities in certain contract project areas, so that such statements may serve as bases for compilation of "sources" lists of organizations who may be solicited to subject specific proposals or individual projects. Unsolicited proposals may be considered for awards when they fulfill specific needs for the NIH component, and the latter does not contemplate issuing a solicitation for the same work.

NIH R&D contract projects generally are subjected to a many-stage review process prior to any awards. For solicited contracts, program advisory committees, composed largely of non-Government experts, suggest types of projects which should be undertaken by the NIH programs to which they relate. Such recommendations are provided also through workshops, conferences, and similar advisory groups. Such ideas are then translated by program staff into specific requests for proposals which define the program requirements and describe the criteria by which the proposal will be evaluated. Proposals received following such

announcements are evaluated by additional technical review groups, again composed largely of non-Federal advisors. Recommendations from these groups, together with the results of separate business evaluations of the proposals, are then reviewed further by appropriate NIH staff groups with outside consultation as needed, who provide final recommendations to the Directors of those Bureaus, Institutes, or Divisions. Variations on these processes are required for review of unsolicited contract proposals and for proposals responding to solicitations for R&D support. All these review, approval, and award processes are conducted in accordance with requirements of Federal and DHEW Procurement Regulations.

NATIONAL INSTITUTE ON AGING

I. Mission of the Institute

The Research on Aging Act of 1974, signed into law on May 31 of that year, provided for the establishment of a National Institute on Aging for the conduct and support of biomedical, social, and behavioral research and training for research related to the aging process and the diseases and other special problems and needs of the elderly. That Institute was established by an Executive Delegation of Authority published October 7, 1974, in the Federal Register.

The initial extramural program of the National Institute on Aging was formed by the transfer of grants and contracts on aging from the National Institute of Child Health and Human Development, where the authority for the support of research on aging resided prior to the establishment of the new Institute.

In carrying out its mission, the National Institute on Aging will build upon its initial extramural program, laying particular emphasis on research and training for research on the causes and mechanisms of aging, medical problems of aging, and psychosocial problems of the elderly.

II. Institute Philosophy on Award Mechanisms

The Institute supports its extramural research and training activities primarily by the grant mechanism and encourages the submission of proposals that fall within its mission. The Institute encourages applicants to discuss any questions they may have regarding the mission of the Institute or the format of proposals with Institute staff. The Institute uses the contract mechanism sparingly and mainly for research or research-related activities for which the grant mechanism would be inappropriate.

III. Program Descriptions

A. Causes and mechanisms of Aging

In the area of causes and mechanisms of aging, proposals are accepted that deal with all levels of biologic function from molecular to organismic, in humans and in experimental organisms, where it appears that the results will contribute to an understanding and thus control of aging processes affecting human health.

B. Medical Problems of Aging

With regard to clinical medicine, the Institute is concerned with general aspects of disease in the aging and aged that are general enough to cut across the missions of Institutes concerned with diseases and specific organ systems or due to particular categories of etiologic agents. It is concerned with general approaches to the control of risk factors and general factors affecting many aspects of the health of older persons such as exercise and nutrition. It is also developing programs in immunologic aspects of aging, the menopause and post-menopausal state, and the senile dementias. The Institute is concerned with the special problems of the medical management of the elderly including their needs with regard to pharmacologic and other therapeutic measures. It is also concerned with differential disease patterns in persons from different ethnic and socioeconomic groups.

C. Psychosocial Problems of the Elderly

The Institute is concerned with the impact of psychosocial problems on the health of the elderly. This includes a consideration of probable future age-structures of the population and their impact on health problems, studies of cognitive function as a function of aging, studies of the health impact of interpersonal relations and worklife and retirement in the aging and aged, and studies of the impact of housing and institutional care on health.

For further information on NIA programs, please contact: Acting Program Director, National Institute on Aging, Bethesda, MD 20014

NIA Programs and Awards

	Research Grants	Program Projects	Specialized Centers	Research Career Development Awards	National Research Service Awards	Research and Development Contracts
A. Causes and Mechanisms of Aging	●	●	●	●	●	●
B. Medical Problems of Aging	●	●	●	●	●	●
C. Psychosocial Problems of the Elderly	●	●	●	●	●	●
D. Aging Research Centers			●			

NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES

I. Institute Mission and Research Funding

The Mission of the National Institute of Allergy and Infectious Diseases (NIAID) is to conduct and support research which will contribute to a better understanding of the causes of allergic, immunologic, and infectious diseases and to the development of better means of preventing, diagnosing, and treating these illnesses. In pursuit of these goals, NIAID-supported scientists draw upon insights provided by almost every biomedical science.

In common with the majority of NIH institutes, NIAID conducts research in its own laboratories (in Bethesda, Maryland; Hamilton, Montana; and Honolulu, Hawaii) and supports research and research training by grants to academic and nonprofit institutions and laboratories. These funds are, for the large part, invested in scientist-initiated, problem-oriented projects, concerned with numerous diseases and disease-related questions relevant to the Institute's mission. Some grants and awards support research training in scientific disciplines or disease areas where shortages of biomedical research manpower exist or are anticipated. In addition, highly targeted and federally-directed research programs are supported by contracts with particularly well-qualified academic, commercial and other organizations.

II. Special Institute Programs

Special Institute Programs are concerned with a set of important national public health problems whose solutions the Institute and its advisors believe would be accelerated through increased research effort. In some instances an Institute Program may be a mix of intramural, extramural (grants) and collaborative (contracts) projects. The purpose and goals of such an Institute Program are rather tightly defined and identifiable and may be the subject of special legislative interest.

On the other hand, an Institute Program may be supported by only one mechanism, such as an extramural Special Emphasis Program (SEP). An SEP is characterized by having a program officer, and a formal, brief program statement or definition which includes goals and content. The SEP and relevant definitions or statements are regularly reviewed by the National Advisory Allergy and Infectious Diseases Council, and the program content, size, and balance are considered. Projects contributing to the goals and objectives of SEP's are assigned to them for funding. Periodically, the individual SEP's are evaluated by *ad hoc* groups on a programmatic basis.

A brief description follows of each Special Institute Program, as listed in the table on the final page.

Allergic and Immunologic Diseases

1. Asthma and Allergic Diseases

The primary goal of Asthma and Allergic Disease Centers Special Emphasis Program is to translate basic concepts in immunology, genetics, biochemistry, and pharmacology into clinical investigations of patients with allergic disease or other immunologic disorders. Applications of current immunologic concepts and methodologies to clinical studies should enable scientists to define the pathophysiologic, biochemical, and immunologic mechanisms of asthma and allergic disorders and to obtain a better understanding of these diseases.

It is hoped that participation in this program will enhance collaboration between medical scientists, whose individual long-term efforts have been in laboratory-based immunologic research, and clinical investigators with a substantial continuing responsibility for the diagnosis and treatment of patients with asthma and allergic disorders. Grant funds should provide a research environment favorable for such interaction and should implement clinical application of adequately tested research findings and procedures.

A prospective Center should have facilities and personnel available which will permit design of proposals representing a multifaceted long-term approach to the investigation of major allergic disorders. Subjects considered especially relevant for study are: (1) the atopic diseases; (2) related disorders caused by insect bites, foods, chemicals, and airborne allergens, infectious and intrinsic factors, and by allergic inflammatory and immune complex processes; and (3) allergic phenomena affecting the respiratory and gastrointestinal tracts, skin, blood, and connective tissues.

In the field of asthma and allergic diseases, research training is also provided under individual National Research Service Awards Institutional Grants for National Research Service Awards, and Allergic Diseases Academic Awards (a sub-category of the Research Career Program Awards). All three categories assist nonprofit institutions to establish or strengthen allergy research programs and, simultaneously, help young medical scientists interested in the field of allergy to broaden their scientific

backgrounds. See page 17 of this Guide for details on application and eligibility.

Contract research efforts in the area of asthma and allergic diseases include preparation of purified antigens E, K, and Ra3 from short ragweed pollen. Preparation of other research materials needed in allergic disease research is underway. These antigens and some corresponding antisera are available for distribution. Qualified investigators are encouraged to inquire of the Chief, Research Resources Branch, NIAID; National Institutes of Health; Building 31, Room 7A11; Bethesda, Maryland 20014.

2. Clinical Immunology and Immunopathology

Closely related to asthma and allergic diseases is the research area of clinical immunology. The Institute is interested in sponsoring coordinated efforts in this field so that clinical immunology and immunopathology can be applied to a broader spectrum of patient problems.

A Special Emphasis Program in Clinical Immunology and Immunopathology deals with investigator-initiated individual or program-project research grants. Major investigative problems and disease areas upon which special attention is being focused are: immune deficiency states; mechanisms of atopic disease; action of chemical and pharmacologic mediators; and immunotherapy.

A program of contracts in transplantation and immunology includes: a) evaluation of tissue matching for organ transplantation; b) collection, quality control, and distribution of tissue matching reagents; c) sponsorship of training programs for tissue typing; d) development and evaluation of new procedures to promote acceptance of grafts; e) organization of workshops on immunology relevant to tissue typing and transplantation; and f) publication of program generated transplantation information such as reagent catalogs.

3. Selective Immunologic Activation

Aware of the potential for disease control inherent in research on cell-mediated and humoral immune responses, the NIAID has established a Special Emphasis Program in this area. The SEP on selective immunologic activation encourages investigators to seek knowledge which will provide the capability to selectively manipulate the immune response. Grants are awarded for studies that are directly concerned with: (1) the development of new, appropriate test systems; (2) analysis of the nature of interactions among immunocompetent cells; (3) evaluation of agents capable of modifying cell mediated and humoral responses selectively; and (4) development of the means of achieving the desired selective response via modifications of the antigen.

4. Lymphocyte Biology

Another Special Emphasis Program within the area of allergic and immunologic diseases focuses on lymphocyte biology since a better understanding of the variability of activation of immunocompetent cells is basic to the development of better means of preventing and controlling disease. The ultimate goal of this SEP is the attainment of more complete knowledge of the life history of lymphocytes and of the genetic factors that determine their fate *in vivo* and *in vitro*. Ideally, techniques and principles of cell culture, cell biology, and other disciplines are integrated into multi-disciplinary program projects.

Infectious Diseases

1. Sexually Transmitted (Venereal) Diseases

This program aims to encourage investigators to undertake research which will provide much needed information relating to the biology and immunology of all sexually-transmitted diseases. Included in a Special Emphasis Program on the Biology of Sexually-Transmitted (Venereal) Diseases are not only gonorrhea and syphilis, but also infections caused by the chlamydial agents, mycoplasma, trichonomas, cytomegalovirus, and herpes type II virus. Studies of the growth, nutrition, and physiology of the organisms causing these diseases and purification, characterization, and determination of the structure of cellular antigens of the organisms are being supported. Specific antibody development, cellular and humoral defenses, and mechanisms of recurrent infection or reinfection are also under study. A major research effort is devoted to development of experimental animal model systems for human infections and of tissue culture methods for study of microorganisms. In light of the growing resistance of some of these organisms to currently available antibiotics, investigators are encouraged to explore the underlying mechanism of antibicrobial action and to undertake studies of new or improved antimicrobial agents.

To expand biomedical research in this field, NIAID supports Institutional Grants for National Research Service Awards. These grants, which are in addition to Individual National Research Service Awards, assist nonprofit institutions in providing health scientists and clinicians opportunities for postdoctoral study in venereal diseases.

A small collaborative program in venereal disease has also been initiated with the award of 6 contracts for the development of methods for the *in vitro* cultivation of *Treponema pallidum* and the serotyping of *Neisseria gonorrhoeae*.

2. Hepatitis

For a number of years, a Special Emphasis Program on Viral Hepatitis has encouraged and supported efforts to isolate the etiological agents of this disease and to determine the best methods of growing hepatitis viruses for vaccine development and production. Definition of the physical and chemical characteristics of the agents of hepatitis A and hepatitis B and the development of *in vitro* and *in vivo* models for study of these agents are sought.

A vigorous collaborative program, spearheaded by intramural scientists, was initiated a few years ago. This contract program for the development of a candidate hepatitis B vaccine, includes biophysical characterization and purification and assay of the antigens, viral units and subunits; development of animal model systems for assay, immunogenicity and mechanism of disease studies; epidemiologic studies in special, high risk populations; and testing prototype vaccine preparations for safety and antigenicity. Additional intramural and collaborative scientists carry out characterization studies following up on the recent visualization of the hepatitis A virus.

3. Influenza and Other Viral Respiratory Infections

Influenza is a major respiratory disease in terms of morbidity and medical care costs. While considerable progress has been made in a basic understanding of the virus, its components, and its variations, much is yet to be discovered before satisfactory or acceptable vaccines are produced to protect those at highest risk.

A Special Emphasis Program in this area seeks to stimulate and support research to obtain information on the influenza virus essential to development of more efficient vaccines. Important components of research on influenza include investigations concerning: (a) structure, replication, and mechanisms of pathogenesis of the influenza viruses; (b) biochemistry of the viruses; (c) limits and nature of antigenic variations of the viruses; (d) nature and duration of specific immunity to the disease; (e) host response to infection; (f) origin of human pandemic strains of virus; and (g) epidemiology of influenza in relation to age, socioeconomic factors, geography, and transmissibility under varying situations.

In addition to supporting grantees and intramural scientists working on the problems of influenza, NIAID initiated in FY 74 a formal program of contract projects on the disease. This collaborative effort supports research activities where long-range goals lead to knowledge that will abort or lessen the impact of future epidemics and pandemics. Vaccines for respiratory pathogens other than the influenza virus are, for the most part, being developed through collaborative efforts. Agents under study include the respiratory, sycytial virus, parainfluenza viruses, and adenoviruses.

4. Disease Control Measures—Research and Development

During the past 10 years, the importance to health of microbial resistance to therapeutic agents has become increasingly apparent. Most of the projects in NIAID's Special Emphasis Program on Mechanisms of Resistance to Antimicrobial Agents are directed toward elucidation of the fundamental biological mechanisms involved in the development of drug resistance.

Research projects of interest to this program include studies on: a) the origin and development of drug resistance in microorganisms, b) replication and conjugal transfer of plasmids, c) biochemistry and genetics of plasmid determined functions, and d) correlated epidemiological and microbiological studies of naturally occurring plasmids with special reference to R factors. A collaborative contracts program dealing with selected aspects of the recombinant DNA molecule problem has just been established.

As the deleterious effects of synthetic organic compounds used as pesticides have become known, new approaches have been sought which will combine biologic control with judicious use of specific chemicals. This approach must be based on adequate information about the ecology of the target organism, the environment in which a control program is to be conducted, effects of control measures on nontarget organisms, and the biology of the disease organisms being transmitted by a vector. A Special Emphasis Program called Biological Regulation of Vectors, established by NIAID, is dedicated to achieving these goals.

Investigations are being sought which involve use of diseases, parasites, or predators which attack the vector. Other studies may focus on the displacement of the vector from the environment by an organism which does not transmit disease. In some cases, investigators may try to modify the behavior of a vector so it can be more easily killed or otherwise prevented from transmitting disease. Projects concerned with the biology or population dynamics of vectors can be expected to provide

knowledge on which biological control programs can be used.

Under the auspices of the U.S.-Japan program, (see page 16), a number of contracts have been awarded for studies of vector-borne diseases. These include production of animals and vectors infected with schistosomiasis or filariasis and development of primary cell lines derived from tissues of fresh water snails.

The complex structure and function of parasites (particularly helminths with their marked changes during different states of development and their extensive migratory activity) have made a study of immunity to animal parasites quite difficult. Recent developments in immunology have opened up exciting opportunities for investigations in this field, however the major ultimate goal of NIAID's Special Emphasis Program on "Immunology of Parasitic Infections" is to develop effective vaccines to prevent such parasitic diseases as malaria, schistosomiasis, and filariasis. It is also hoped that better immunodiagnostic procedures for these parasitic infections can be developed.

Projects directed toward these objectives may involve a broad spectrum of studies on: (a) identification and characterization of functional antigens from components of parasites and their by-products; (b) nature and mechanisms of the host response to the infection; (c) mechanisms of the effects of the immunological response on the parasite inciting the reaction, on concurrent infections with other organisms, and on the host itself; and (d) pathophysiologic factors effecting cellular inflammatory responses characteristic of hypersensitivity phases of parasitic infections.

NIAID has had, for some years, a Special Emphasis Program on Streptococcal Diseases and Sequelae, because widespread use of antibiotics has not eliminated these most common bacterial infections. The research grants program is currently focused on two major areas: the biology of the streptococcus; and the pathogenesis and clinical aspects of streptococcal disease. Studies currently are being carried out on the antigenic mosaic of streptococcal cell walls with special attention being paid to surface polysaccharides and M protein. Exotoxins, pyrogens, and enzymes of streptococci are also under intense investigation. NIAID collaborative research on streptococci has already led to the development of a candidate vaccine utilizing M protein from several group A sterotypes. This is currently being evaluated in adult volunteers for safety and immunogenicity.

As part of the U.S.-Japan Cooperative Medical Science Program, (page 16), both grants and contracts are used to support research on the development of a more effective cholera toxoid or vaccine. In a spin-off from this program, investigators are being encouraged to study similarities between enterotoxins produced by *E. coli* and *V. cholerae*. Since the immunological relationship between these two organisms seems to have been firmly established, the Institute feels the time is ripe to determine the magnitude of the disease problems caused by *E. coli* toxins and the need for control measures, such as an effective vaccine.

Collaborative studies are also focused on the development of vaccines against two organisms—*H. influenzae* and *N. meningitides*—primarily responsible for bacterial meningitis in young children and infants. In addition, clinical studies in children of groups A and C meningococcal polysaccharide vaccines are being carried out by NIAID contractors. Other collaborative research is focused on the development and testing on multivalent pneumococcal polysaccharide vaccines including the evaluation of a special formulation for the prevention of otitis media in children. Grant supported research in this area includes studies of genetic control of capsule production and pathogenesis of pneumococcal infection.

5. Antiviral Substances

Research on antiviral substances is an active component of all three segments of the Institute program—extramural, intramural, and collaborative studies. Grants—part of a Special Emphasis Program—support scientists conducting basic research on how drugs and other antiviral substances work in the cell and in animals. These projects include investigations of the molecular mechanisms of action and structure of interferon, since this information is needed for meaningful attempts at synthesis.

The collaborative program involves contract research on the development, purification and laboratory and clinical evaluation of exogenous interferon and interferon inducers, as well as laboratory and clinical evaluation of other antiviral substances.

6. Hospital-Associated Infections

A Special Emphasis Program has been approved by the National Advisory Allergy and Infectious Diseases Council, to help overcome the very grave problem of infections occurring within the hospital environment. The goals of the program are to enlarge our store of fundamental knowledge regarding this category of infections, and to apply the new knowledge to develop positive methods for prevention and treatment of these infections.

This research grants program consists of two major categories: (1) studies on host resistance;

and (2) environmental studies. Major emphasis will be placed on the first part of the program, dealing with the resistance mechanisms, both humoral and cellular, of normal patients and those with impaired immune defenses. Examples of infectious agents of major interest to this program are the Gram-negative bacteria, the pathogenic yeasts (e.g., *Candida*), and viral agents such as cytomegalovirus and herpes.

7. Chronic and Degenerative Diseases of Man

The causes of a number of chronic and degenerative diseases of man are not known, but findings obtained from studies of a few of these human illnesses, and of several in animals, suggest that viruses or virus-like agents may play a central role. A Special Emphasis Program in this area has as its goal the isolation, characterization, and identification of candidate causative agents from patients with certain chronic and degenerative diseases of unknown etiology. Viruses and virus-like agents that appear to have an etiologic relationship to chronic and degenerative diseases of animals may be worth studying as models of similar human diseases.

8. Clinical Virology

A Special Emphasis Program on clinical virology has been established recently in response to an apparent need for a better understanding of the pathogenesis of human viral infections. The clinically-oriented knowledge is lagging behind contemporary discoveries of molecular virology. The SEP aims to merge the talents of young investigators well versed in the technologies and concepts of modern virology with those of clinical investigators, ideally in the setting of a hospital-based virus diagnostic laboratory.

Grants will support development of rapid, sensitive, and economical laboratory methods of diagnosing the more common viral infections. Awards will also be made for investigations on effects of the route of administration of viral immunogens since this could affect the distribution and character of the resultant human host immunity. Other studies in this SEP will include those focusing on the mechanisms modifying defense responses which allow recovery with lasting immunity, on the one hand, or result in chronic recurrent infections, immunologic disease, or fatal infection, on the other. The interaction of virus and human host genetic systems in viral replication and human host cell injury should be explored.

9. International Programs

Two NIAID grant and contract programs cut across both disciplinary and management lines. These are the United States-Japan Cooperative Medical Science Program, and the International Centers for Medical Research.

The U.S.-Japan Cooperative Medical Science Program (CMSP) was initiated in 1965 following a meeting between the Prime Minister of Japan and the President of the United States. Both Governments now appoint biomedical scientists to constitute a U.S.-Japan CMSP joint committee. U.S. members are appointed by the Department of State. The Committee advises on scope of the program and develops procedures for review of projects to ensure fulfillment of the Program's purposes. Guidance for the actual research program for each disease category is provided by staff and by an *ad hoc* panel of experts.

This joint research effort has been briefly mentioned earlier in this section. It focused specifically on seven disease categories of great concern to Asian nations: cholera, leprosy, tuberculosis, the parasitic diseases—filiariasis and schistosomiasis-malnutrition, and certain viral diseases (rabies, dengue). Recently, research has expanded to include the development of methods for evaluating the effect of environmental pollutants as a cause of cancer and cell changes.

Projects proposed by U.S. scientists and relevant to program goals are reviewed for merit by a regular NIH study section. Acting for NIH, NIAID provides funding and administration for approved research projects. The Japanese Ministries of Health and Welfare and of Education assume a similar responsibility for their counterpart activities.

The International Centers for Medical Research (ICMR) Program was established in 1960 to meet the desire of Congress to advance through international cooperative research the status of health sciences in the United States. An ICMR is a discrete foreign research organization, sponsored by a medical or public health school in the United States. It provides a stable base on which to conduct programs of biomedical research, training and planning, both in the United States and abroad, through a working agreement between a U.S. institution and an established foreign research center. This cooperative arrangement provides opportunities for research not available in the United States and trains a cadre of U.S. investigators in problems of geographic medicine as they may affect U.S. interests.

The ICMR program is currently supported by comparatively tightly managed grants which from time to time are presented to the NIAID Advisory Council. Following Study Section and Council review, grants are awarded on a 5-year basis with continued support contingent on an-

nual program review. The four U.S. institutions and their foreign affiliates now participating in this program are: University of California and Institute for Medical Research, Kuala Lumpur, Malaysia; Johns Hopkins University and several laboratories in Dacca, Bangladesh; University of Maryland and the Institute of Hygiene, Lahore, West Pakistan; and Tulane University and the Universidad del Valle, Cali, Colombia. A fifth ICMR sponsored by the Louisiana State University in San Jose, Costa Rica, formerly had NIAID core support, but has been operating independently since 1970.

10. Research Reagents and Other Resources

The Institute has an extensive program to supply qualified researchers with carefully prepared and authenticated seeds, antisera and other preparations of microbiological interest, that are not otherwise available through commercial sources. These reagents have been mentioned earlier in this section and are generally intended for reference purposes although some, which are unusually difficult or expensive to prepare, are supplied in working quantities for certain types of collaborative or special program activities.

The following types of material are available:

Seeds and corresponding antisera for a wide range of viruses

Seeds and antisera for various mycoplasma, *Vibrio cholerae* and mycobacteria

Antigens and antisera for a variety of mycobacterial fractions

Antisera for hepatitis B virus and subtypes

Reference preparations and antisera for several species of interferons

Reference preparations of interferon inducers

Arthropod blood meal identification sera

Reference preparations and antisera for several purified allergens

Animal hosts infected with filaria or schistosoma (also infected snails)

Histocompatibility typing sera.

NIAID Programs and Awards

		Research Grants*			Research Career Program Awards		National Research Service Awards*		Research and Development Contracts‡
		Project	Program Project	Centers	RCDA	ADAA	Institutional	Individual	
Allergic and Immunologic Diseases									
1. Asthma and Allergic Diseases		●	●	●	●	●	●	●	●
2. Clinical Immunology and Immunopathology		●	●		●			●	●
3. Immunobiology and Immunochemistry		●	●		●			●	
Selective Immunologic Activation		●	●		●			●	
Lymphocyte Biology		●	●		●			●	
Infectious Diseases									
1. Sexually-Transmitted Diseases		●	●		●		●	●	●
2. Hepatitis		●	●		●			●	●
3. Influenza and Other Viral Respiratory Infections		●	●		●			●	●
4. Disease Control Measures — R&D		●	●		●				●
Mechanisms of Resistance to Antimicrobial Agents	SEP	●	●		●				●
Streptococcal Diseases and Sequelae	SEP	●	●		●			●	●
Biological Regulation of Vectors	SEP	●	●		●			●	●
Immunology of Parasitic Infections	SEP	●	●		●			●	●
5. Antiviral Substances		●	●		●			●	●
6. Hospital-Associated Infections		●	●		●			●	●
7. Chronic and Degenerative Diseases of Man		●	●		●			●	
8. Clinical Virology		●	●		●			●	
9. International Programs		●†		●†					●†
10. Research Reagent and Other Resources									●‡

* For further information on programs supported by grants and training awards inquire of: Associate Director for Extramural Programs, NIAID, National Institutes of Health, Westwood Building, Room 703, 5333 Westbard Avenue, Bethesda, Maryland 20014

† For further information specifically on International Programs, especially the U.S.-Japan Cooperative Medical Science Program, inquire of: Chief, Geographic Medicine Branch, NIAID, National Institutes of Health, Building 31, Room 1B62, Bethesda, Maryland 20014

‡ The Institute's decisions to initiate contract activities or to request proposals on specific problems are routinely announced in the Commerce Business Daily. For further information on programs supported by contracts and on research reagents (including catalogs) inquire of: Associate Director for Collaborative Research, NIAID, National Institutes of Health, Building 31, Room 7A03, Bethesda, Maryland 20014

NATIONAL INSTITUTE OF ARTHRITIS, METABOLISM AND DIGESTIVE DISEASES

I. Mission of the Institute

The National Institute of Arthritis, Metabolism, and Digestive Diseases conducts and supports research related to a broad array of diseases that are characterized by chronicity and long-term disabling effects rather than by mortality: various arthritic diseases and related rheumatic and connective tissue disorders; diabetes and other inherited errors of metabolism; diseases of the gastrointestinal tract, including diseases of the liver and gallbladder; endocrine disorders; diseases of the blood and bone; urological and kidney diseases. The Institute also conducts and supports research related to such fields as orthopedic surgery, dermatology, and nutrition and nutrition-related disorders.

Over the years the Institute has expanded its program with direct Congressional madate to move forward energetically in specific areas such as in the development of more effective and less expensive artificial kidneys and other methods of treatment of end-stage kidney disease. Special emphases have been placed on research and collaborative programs in digestive diseases, nutrition, diabetes, hematology, dermatology, and arthritis. Of recent note has been the impetus provided by the enactment of the National Diabetes Mellitus Research and Education Act of 1974 and the National Arthritis Act of 1974.

The Institute's total program of direct research and research support necessarily includes studies of a fundamental nature as they are associated with the disease objectives specified. Thus, the Institute has an important stake in the pursuit or support of research in those fundamental sciences which provide the foundation of knowledge pertinent to any of the above diseases. To accomplish its objectives, the Institute acquires new biomedical information through research supported by grants at institutions across the country, through direct research activities at NIAMDD facilities in Bethesda and in Phoenix, through various field studies, and through centrally-directed collaborative research contract awards.

II. Institute Extramural Program Areas

The Institute's extramural programs support research conducted by qualified scientists, both fundamental and clinical, at universities, medical schools and other research centers throughout the United States. The Institute's categorical disease responsibilities are distributed over ten substantive program areas: arthritis, dermatology, diabetes, endocrinology, digestive diseases, hematology, metabolism, nutrition, orthopedics, and kidney diseases and urology. Research Project grants and Program Project grants are currently available in each of these program areas, as are National Research Service Awards and Research Career Development Awards. Applications for Center Grants and for Clinical Investigator Awards are currently being accepted for the diabetes, digestive diseases, and nutrition programs only.

III. The Institute Collaborative Programs

The Institute's major collaborative program is a result of Congressional mandate and supports studied related to end-stage kidney disease treatment. In addition, selected collaborative studies are being supported in many of the research program areas.

IV. Institute Special Programs

A. Scientific Communications Program Publication Of:

Diabetes Literature Index
Endocrinology Index
Index of Dermatology
Gastroenterology Abstracts & Citations
Artificial Kidney Bibliography

B. Hormone Development Program

The Institute maintains a hormone development and distribution program, the products of which are available to qualified research scientists through the Institute's hormone distribution officer. Part of the program is the National Pituitary Agency which is the only source of human growth hormone in the United States for research and treatment of hypopituitary dwarfism in the hands of selected clinical scientists.

C. U.S.-Japan Cooperative Medical Science Program

The malnutrition portion of this program is under the purview of the Institute. The program comprises a number of research grants and contracts related to various aspects of human malnutrition important to the countries of Southeast Asia.

D. Overseas Research Activity funded by PL 480 Local Currencies

A number of research projects located abroad are funded by U.S.-owned local currencies derived from the sale of surplus agricultural commodities to the countries involved. The subject matter of these projects, which do not draw from the regular Institute budget, has been carefully selected to be relevant to the health mission of NIAMDD.

E. U.S.-USSR Cooperative Program

V. Information and Application

Information regarding all NIAMDD extramural programs may be obtained through the office of the Associate Director for Extramural Program Activities. Research grant application materials may be obtained directly through the NIH Division of Research Grants.

Prior to the submission of applications for Center Grants, Program Project Grants, Institutional National Research Service Awards, or Contracts, prospective applicants should contact:

Associate Director for Extramural Program Activities
Westwood Building, Room 607
National Institute of Arthritis, Metabolism, and Digestive Diseases
National Institutes of Health
Bethesda, Maryland 20014

NIAMDD Programs and Awards

	Research Project Grants	Program Project Grants	Specialized Center Grants	Research Career Program Awards	National Research Service Awards	Clinical Investigator Awards	Research and Development Contracts	Scientific Communications	Special Cooperative Programs US-Japan/US-Russia
Arthritis	●	●		●	●		●		●
Dermatology	●	●		●	●		●	●	
Diabetes	●	●	●	●	●	●	●	●	
Endocrinology	●	●		●	●		●	●	
Digestive Diseases	●	●	●	●	●	●	●	●	
Hematology	●	●		●	●		●		
Metabolism	●	●		●	●		●		
Nutrition	●	●	●	●	●	●	●		●
Orthopedics	●	●		●	●		●		
Urology & Renal Diseases	●	●		●	●		●	●	

NATIONAL CANCER INSTITUTE

I. Mission

The National Cancer Institute (NCI), established under the National Cancer Act of 1937, is the Federal Government's principal agency for cancer research and control.

The National Cancer Act of 1971 directed the Institute to "plan and develop an expanded, intensified, and coordinated cancer research program, encompassing the programs of the NCI, related programs of other Research Institutes, and other Federal and non-Federal programs." To speed the translation of research results into widespread applications, the Act authorized a cancer control program to demonstrate and communicate to both the medical community and general public the latest advances in cancer prevention and management.

II. Funding

NCI supports some research in its own intramural research laboratories, and provides some small support to other Federal agencies through interagency agreements. However, the great bulk of funds—of the order of 80 percent—goes to the external scientific community through the award of grants and contracts. Non-profit institutions such as universities, hospitals, private research facilities and State and local governmental organizations, may receive either grants or contracts. Profit-making organizations may receive contracts.

NCI awards grants for cancer-related activities in laboratory and clinical research (either individual projects or program projects), in cancer control, for cancer centers, for construction, for conferences and for training. Grant applications are initiated and prepared by outside scientists, and submitted to the Division of Research Grants, NIH. After peer review, usually by NIH Study Sections and the National Cancer Advisory Borad, NCI awards grants to the extent of available funds.

In addition to grants in these categories, NCI administers a Cancer Research Emphasis Grant (CREG) program to answer research needs of the National Cancer Program. CREG funding will be used for research projects in specific program areas identified by the National Cancer Institute with advice from external consultants and advisory committees. CREG applications will be in answer to specific program area announcements, with the approach and methodology left to the creativity of the chosen investigators. Direction or technical supervision from NCI is neither necessary nor desirable. CREG will promote research in areas where there are gaps in knowledge deemed advisable to fill, where there is need for independent research to verify and corroborate research findings, or where there is a need to intensify the activity in promising research areas.

Announcements of CREG projects will be published in the "NIH Guide for Grants and Contracts" and other appropriate publications. CREG applications will be reviewed by NIH Study Sections, and will be awarded by NCI to the extent of funds allocated to each specific area of research emphasis.

NCI awards contracts in laboratory and clinical research and development and for cancer control projects. Although most NCI contracts are awarded through competition, unsolicited proposals for contracts in cancer research are accepted, reviewed, and may be awarded if funds permit, and if there is sufficient "justification for non-competitive procurement."

III. Programs

In the following listing the various extramural programs of the National Cancer Institute are categorized into Cancer Research, Cancer Control, and Cancer Resource Development. A brief description is given for each program plus the sponsoring division of NCI and the source of further information. The mechanism of funding of each program is also listed, whether contract or grant. Except for basic tumor biology research which is supported only by grants, all general areas of research and control can be supported by either contract or grant, to include Cancer Research Emphasis Grants as announcements are made. In the field of Resource Development, however, only grants are generally available, although some conferences and construction have received contract support.

Specific cancer projects may fit into several different programs. When a research grant application is received, the staff will assign it to a specific program. Contract proposals responding to the RFP go automatically to the program which advertised the RFP, but unsolicited contract proposals are best sent to a specific program.

A. Cancer Research

1. Epidemiology grants

The epidemiology program studies probable contributions to human cancers of factors such as viral infections, carcinogenic chemicals, radiation exposure, endogenous and exogenous hormones and genetic predisposition. Research projects include cancer epidemiology, human population genetics, biometry and computer

science, and psychological factors relating to cancer.

For further information contact the Division of Cancer Research Resources and Centers, NCI, NIH, Bethesda, Maryland 20014

2. Field Studies and Statistics Contracts

This Program has three major factors: research into the causation of cancer in free-living populations; development of experimental designs for cancer epidemiology studies, with attendant mathematical and statistical support; and development of basic data on cancer incidence, prevalence and mortality in the United States with enough precision to allow valid measurement of success and failure of prevention, diagnosis or treatment techniques. The program is setting up a permanent data collection and analysis system to standardize the statistical base for future cancer research.

For further information, contact the Deputy Director, Division of Cancer Cause and Prevention, NCI, NIH, Bethesda, Maryland 20014.

3. Carcinogenesis Grants

The program for carcinogenesis grants funds research to find effective means of preventing human cancer caused or promoted by chemical or physical agents. Research areas include mechanisms of action, identification of proximate and ultimate carcinogens, and biochemical changes in physiological compounds and processes produced by carcinogens.

For further information, contact the Division of Cancer Research Resources and Centers, NCI, NIH, Bethesda, Maryland 20014.

4. Carcinogenesis Contracts

The program awarding carcinogenesis contracts conducts coordinated research and development on cancer prevention and on possible chemical and physical factors as causes of cancer. Indentification of population groups at risk and determination of possible causes of such high risks, identification by bioassay of carcinogenic activities of selected chemicals, development of suitable animal model systems for bioassays, and charting biochemical steps involved in the process of chemical and physical carcinogenesis are major responsibilities of this program. One facet of the program studies means to develop less hazardous cigarettes and anti-smoking drugs.

For further information, contact the Deputy Director, Division of Cancer Cause and Prevention, NCI, NIH, Bethesda, Maryland 20014.

5. Viral Oncology Grants

This program supports research on the role of viruses in causing cancer and the consequences of this potential causative agent for identification of susceptible individuals, early diagnosis, and development of new modes of prevention and treatment.

For further information, contact the Division of Cancer Research Resources and Centers, NCI, NIH, Bethesda, Maryland 20014.

6. Viral Oncology Contracts

The program for viral oncology contracts awards projects to determine the significance of viruses in inducing cancers in man and animals, intended ultimately to prevent and control cancers of viral origin. The program encompasses basic, developmental and applied research directed toward elucidation of viral oncogenesis and eventual neutralization of the process to prevent cancer from developing.

For further information, contact the Deputy Director, Division of Cancer Cause and Prevention, NCI, NIH, Bethesda, Maryland 20014.

7. Tumor Biology Grants

This program examines the fundamental nature of cancer for information that could lead to better methods of prevention, detection, diagnosis and treatment. Investigative approaches include cell biology, molecular biology, developmental biology, genetics, morphology and pathology.

For further information, contact the Division of Cancer Research Resources and Centers, NCI, NIH Bethesda, Maryland 20014.

8. Immunology Grants

The immunology program concerns all phases of immunology, including immune mechanisms related to both cancerous and non-cancerous processes, tumor antigens, enhancement of antigenicity, tests for immune responses, and model systems to test combined therapeutic modalities.

For further information, contact the Division of Cancer Research Resources and Centers, NCI, NIH, Bethesda, Maryland 20014.

9. Tumor Immunology Contracts

The tumor immunology program comprises research and development in three areas: tumor immunobiology, cancer immunodiagnosis and the immunotherapy of cancer. The program includes both laboratory and clinical studies.

For further information, contact the Associate Director for Program Planning, Division of Cancer Biology and Diagnosis, NCI, NIH, Bethesda, Maryland 20014.

10. Diagnostic Research and Prevention Grants

This program supports investigations to improve current techniques and develop better

methods of cancer prevention, early detection, treatment and rehabilitation. The program also identifies areas where increased manpower and facilities might be productive.

For further information, contact the Division of Cancer Research Resources and Centers, NCI, NIH, Bethesda, Maryland 20014.

11. Cancer Diagnosis Contracts

This program is concerned with the development of screening tests to detect early cancers, and improvement of methods for locating and visualizing the tumor after detection. Avenues under investigation include hormonal and biochemical marker tests, applications of improved cytologic screening methods, automated techniques for reading cytologic specimens, and better radiologic and other physical imaging techniques.

For further information, contact the Associate Director for Program Planning, Division of Cancer Biology and Diagnosis, NCI, NIH, Bethesda, Maryland 20014.

12. Drug Development Grants

The drug development program encompasses studies to develop and evaluate possible chemotherapeutic agents for cancer. There are five major areas of investigation: synthesis and isolation of possible anticancer agents; preclinical evaluation of these agents for toxicity and effectiveness; mechanism of drug action; clinical pharmacology; and total drug evaluation in research program projects and clinical centers.

For further information, contact the Division of Cancer Research Resources and Centers, NCI, NIH, Bethesda, Maryland 20014.

13. Chemotherapy Grants

The chemotherapy program provides grant support for the research necessary for use and evaluation of the effects of anticancer drugs in the treatment of human cancer. There are four specific areas: studies of toxicity and effectiveness and chemotherapeutic drugs in combination with surgery, radiotherapy or immunotherapy; developmental studies using animal models and cellular systems; toxicity studies; and studies of cancer-related disorders that might interfere with anticancer drug activity.

For further information, contact the Division of Cancer Research Resources and Centers, NCI, NIH, Bethesda, Maryland 20014.

14. Radiation Grants

The radiation program is concerned with research in radiation biology and radiation physics to broaden the therapeutic applications of radiation therapy. The program also supports training activities to provide adequate personnel for future clinical and basic research needs. Specialized Clinical Radiation Therapy Centers provide the patient and personnel resources and appropriate facilities needed to evaluate new developments in radiation therapy.

For further information, contact the Division of Cancer Research Resources and Centers, NCI, NIH, Bethesda, Maryland 20014.

15. Surgery Grants

This program supports research to improve surgical techniques for the treatment of cancer.

For further information, contact the Division of Cancer Research Resources and Centers, NCI, NIH, Bethesda, Maryland 20014.

16. Supportive Care Grants

Studies in supportive care research concern development of methods of long-term support for the cancer patient who is subject to potential life-threatening situations caused by his or her disease or by cancer treatment. Platelet transfusions for the control of hemorrhage, and leucocyte transfusions and germ-free protective environments, such as laminar air-flow units, for control of infection are examples of patient support systems under investigation.

For further information, contact the Division of Cancer Research Resources and Centers, NCI, NIH, Bethesda, Maryland 20014.

17. Clinical Cooperative Grant Support

Grant support is provided to clinical cooperative groups for the clinical evaluation of new methods of cancer treatment in large numbers of patients. Emphasis has been largely on the study of new cancer drugs, but is now beginning to include combinations of chemotherapy with radiation, surgery and immunotherapy.

For information, contact the Division of Cancer Research Resources and Centers, NCI, NIH, Bethesda, Maryland 20014.

18. Cancer Treatment Contracts

The ultimate goal of this research and development program is to assure a normal life expectancy to all cancer patients. Shorter term goals are to increase the number of cancer patients responding to therapy with cancer drugs, surgery, radiotherapy and immunotherapy, and to prolong periods of remission of disease through these therapies.

One segment of the program is concerned with the identification, development and evaluation of new anticancer drugs. These activities include acquisition, screening, formulation, toxicology and pharmacology studies of new drugs, as well as clinical studies of their effectiveness.

Another segment is the integration of local and systemic therapy modalities into appro-

priate treatment strategies for specific forms of cancer. The local modalities of surgery and radiotherapy are therapeutically complementary to the systemic eradication of cancer cells by chemotherapy and possibly immunotherapy. Projects are also funded in supportive care, particularly aiming to protect those patients at high risk of infection because of their disease or the immunosuppressive effects of chemotherapy or radiotherapy.

For further information, contact the Deputy Director, Division of Cancer Treatment, NCI, NIH, Bethesda, Maryland 20014.

19. Organ Site Programs

Support is provided for research directed specifically toward certain of the common sites of cancer. The work includes epidemiology, causation, experimental biology, detection and diagnosis, and treatment.

a. Breast Cancer Task Force

The work is conducted under contract. For further information, contact the Associate Director for Program Planning, Division of Cancer Biology and Diagnosis, NCI, NIH, Bethesda, Maryland 20014.

b. National Large Bowel Cancer Project

This work is supported by grant. For further information, contact the Division of Cancer Research Resources and Centers, NCI, NIH, Bethesda, Maryland 20014.

c. National Bladder Cancer Project

The work is supported by grant. For further information, contact the Division of Cancer Research Resources and Centers, NCI, NIH, Bethesda, Maryland 20014.

d. National Prostate Cancer Project

This work is supported by grant. For further information, contact the Division of Cancer Research Resources and Centers, NCI, NIH, Bethesda, Maryland 20014.

e. National Pancreas Cancer Project

The work is supported by grant. For further information, contact the Division of Cancer Research Resources and Centers, NCI, NIH, Bethesda, Maryland 20014.

B. Cancer Control

This integrated program of cancer control and rehabilitation activities involves a five-pronged effort stressing identification of new methods and knowledge applicable to control activities, field testing, evaluation, demonstration in the community, and promotion of more effective techniques. The program does not support laboratory or clinical research except in the area of rehabilitation, but will support work to improve the application and distribution of existing methods for reducing the incidence, morbidity and mortality of cancer. Projects are supported through contracts, cancer control grants and Cancer Research Emphasis Grants in three main areas of intervention against cancer. For further information, contact the Director, Division of Cancer Control and Rehabilitation, NCI, NIH, Bethesda, Maryland 20014.

1. Prevention Intervention Area

The prevention program involves activities to identify methods and techniques to educate and persuade the American public to use available information about cancer prevention.

2. Detection, Diagnosis and Pretreatment Evaluation Intervention Area

Activities in this program concentrate on promoting more effective communication among physicians, health professionals, and the public about the detection, diagnosis and pretreatment evaluation of cancer patients, particularly regarding improvements ready for community practice. Demonstration screening programs for high-risk members of the community are also under way.

3. Treatment, Rehabilitation and Continuing Care Intervention Area

The program promotes more effective communication between health professionals and the public about treatment and rehabilitation. The program is concerned with developing better rehabilitative and continuing care protocols, including patient counseling and training geared toward complete rehabilitation of the patient.

C. Cancer Resource Development

1. Comprehensive Cancer Center Grants

Cancer center grants support Comprehensive Cancer Centers throughout the country, where the whole gamut of the research and control effort is brought into play in a multidisciplinary program ranging from basic research through diagnosis, treatment, rehabilitation, education of personnel, compilation of epidemiologic data, demonstration of proven techniques of cancer care and prevention, and community outreach programs. Comprehensive Cancer Centers are selected after they have proven themselves capable of conforming to the rigorous criteria established by the National Cancer Advisory Board.

2. Specialized Cancer Centers Grants

Specialized Cancer Centers contain some, but not all, of the capabilities of the Comprehensive Cancer Centers. Some specialized centers, working on basic research, have no clinical involvement, whereas others concen-

	Behavior	Biochemistry	Cancer Biology	Cancer Centers	Cancer Control	Carcinogenesis	Chemotherapy	Combined Modality Therapy	Community Involvement	Construction	Detection	Diagnosis	Drug Development	Education	Epidemiology, Demography, Statistics	Immunology	Immunotherapy	Information	Molecular Biology	Nutrition	Organ Site Programs	Pathology	Pharmacology & Toxicology	Radiation Biology	Radiation Physics	Radiotherapy	Rehabilitation	Research Resources & Services	Surgery	Supportive Care	Training	Viral Oncology
Division of Cancer Research Resources & Centers (DCRRC)	●	●	●	●	○ ●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Division of Cancer Cause & Prevention (DCCP)	○	○	○			○				○	○			○	○	○	○	○	○	○		○	○	○			○			○	○
Division of Cancer Biology & Diagnosis (DCBD)											○	○			○	○					○										
Division of Cancer Treatment (DCT)		○	○		○		○	○					○			○	○		○		○		○		○		○		○		○
Division of Cancer Control & Rehabilitation (DCCR)	○ ●			○ ●	○ ●			○	○ ●		○ ●	○ ●		○ ●	○ ●		○ ●	○ ●				○				○	○ ●		○ ●	○ ●	

Extramural Activities Key: Grants = ● Contracts = ○

trate on patient care in one or more types of cancer. There are about 17 Specialized Cancer Centers that concentrate on basic research, and 34 that focus on one or more areas of clinical investigation.

3. Construction Grants

NCI supports construction and renovation of research facilities when necessary for expansion of cancer research programs. These grants can fund up to 75 percent of the total cost, with the remainder to be supplied through non-Federal sources.

4. Conference Grants

Funding is available to support cancer research conferences to facilitate communication and coordination of effort among scientists. For further information on all the above Cancer Resource Development programs, contact the Division of Cancer Research Resources and Centers, NCI, NIH, Bethesda, Maryland 20014.

5. Clinical Cancer Education Grants

These grant awards are designed for a threefold purpose: to encourage development of educational programs to improve the care of cancer patients; to enable students in the health professions to acquire expertise in cancer diagnosis, care and treatment, and prevention; and to satisfy the need for trained health professionals to deal with cancer. The thrust of the program is to support specialized education in cancer management, not general medical information.

For further information, contact the Chief, Education Branch, Division of Cancer Research Resources and Centers, NCI, NIH, Bethesda, Maryland 20014.

6. National Research Service Awards

National Research Service Awards for individual postdoctoral fellows are made to individuals to support specific training proposals selected as a result of national competition. Institutional grants for National Research Service Awards for research training are awarded for up to five years to eligible institutions, to develop or enhance research training for predoctoral and postdoctoral fellows, selected by the institution.

For further information, contact the Chief, Training Branch, Division of Cancer Research Resources and Centers, NCI, NIH Bethesda, Maryland 20014.

The following chart provides a catalog of the areas of grant and contract awards provided by the five divisions of the National Cancer Institute.

NATIONAL INSTITUTE OF CHILD HEALTH AND HUMAN DEVELOPMENT

Mission of the Institute

The Institute is dedicated to conducting and supporting an integrated program of research into the sequential changes characteristic of individual development, both biological and behavioral, from the moment of fertilization through maturation. This approach, which cuts across disciplines and spans both normal and abnormal development, provides a sound scientific basic for continuing improvements in the health and well-being of the American people, whatever their ages.

To achieve its mission, the Institute has identified four primary areas for programmatic development, each corresponding to a crucial cluster of problems of both scientific and social importance and urgency: reproduction and population studies, perinatal biology and infant mortality, growth and development, and mental retardation. Within the four areas, the Institute recognizes certain goals as preeminent. Its mission may thus be seen as:

—Understanding the reproductive process, including the development and evaluation of contraceptives and the behavioral and social aspects of population problems

—Realizing the maximum health and well-being for every pregnant woman and her progeny

—Defining the prerequisites for the optimal human development from infancy through childhood and adolescence to adulthood

—Preventing, detecting, and treating mental retardation and improving the intellectual capacity of normal and retarded individuals.

Special emphasis is placed on studies on sudden infant death syndrome, embryogenesis, problems in pregnancy and its outcome, and nutrition as it relates to developmental processes.

A. Center for Population Research

1. Introduction

The mission of the Center for Population Research is to encourage research and training with grants and contracts, in both biomedical and social science areas associated with population. The program has several objectives.

In the social sciences, the objective is to develop scientifically valid findings on the causes and effects of population change. These findings will provide the basis for rational decisions by both individuals and governments in matters affecting population growth and distribution.

The Center for Population Research is organized into four branches to carry out its program. The *Population and Reproduction Grants Branch* supports research in fundamental areas of biomedical and social sciences through the full array on research and training grants mechanisms. The remaining three branches award research contracts and issue Requests for Proposals (RFPs) in areas of research from applied biological studies and chemical synthesis projects to studies of biomaterials and bioengineering of contraceptive devices. The *Contraceptive Evaluation Branch* stimulates research on the medical effects of methods of regulating fertility. The *Behavioral Sciences Branch* identifies and supports research on specific aspects of the relationships between population and social, economic and psychological variables.

2. Biomedical Research and Development

A. Fundamental Biological Investigations

To develop comprehensive knowledge of human reproduction, research is supported on all aspects of human and relevant animal reproductive processes in both the female and male.

B. Contraceptive Development

This contract activity involves projects in the following areas:

1. Development of new potential contraceptive drugs.
2. Clinical trials designed to evaluate the safety and efficacy of new drugs and devices for fertility regulation in both men and women.
3. Development of systems and/or materials for uninterrupted administration of antifertility drugs aimed at improving the safety and efficacy of presently available drugs.
4. Development of methods for permanent and reversible sterilization in females and reversible sterilization in males.
5. Development of biochemical and biophysical techniques for the prediction and detection of ovulation.
6. Studies of how sperm mature and acquire the capacity to fertilize ova; functions of the male duct system and accessory glands; factors affecting the transport of sperm to the site of fertilization; survival and movement of sperm in the female tract; enzymes of sperm.
7. Development of techniques for observing the normal function of the oviduct in ovum pick-up and transport, and studies of the effect of hormones and physical factors on the oviduct.

8. Studies of hormones involved in reproduction and of methods for measuring them.
9. Studies of cervical physiology including sperm transport; characterization of cervical secretions and steroid hormone receptors during the menstrual cycle.

C. Contraceptive Evaluation

For purposes of identifying and evaluating the medical effects of methods of regulating fertility, research in the following areas is supported:

1. Contraceptive Steroids:

Investigations of specific *adverse effects*, either known or suspected to be related to contraceptive steroids are being conducted. These include controlling studies of:

1) Possible effects of contraceptive steroids on breast cancer, cancer of the cervix, invasive and *in situ*.
2) Thromboembolism and stroke related to contraceptive steroids, and identification of precursors to characterize sub-populations at increased risks.
3) Occurrence of hypertension in association with the use of contraceptive steroids, and the natural history of this hypertensive response.

Investigations of metabolic effects of potential health significance which include studies of the effects of contraceptive steroids on carbohydrate metabolism, lipid metabolism, water and electrolyte metabolism.

Contraceptive steroids have been shown to affect various nutritional parameters in man. Currently supported studies include surveys of the nutritional status of oral contraceptive users, and clinical investigations of interactions of oral contraceptives with specific nutrients, and the consequence of these interactions. Animal studies are intended to elucidate the metabolic basis of the interactions of oral contraceptives with essential dietary nutrients.

Research is proceeding on the relationship between use of oral contraceptive steroids and congenital malformations or other adverse effects in the offspring. Also included are studies concerned with the effect of contraceptive steroids and lactation of the nursing infant.

2. Intrauterine Devices:

Specific studies are concerned with the identification of serious complications associated with intrauterine devices currently in use.

3. Vasectomy:

Vasectomy is an accepted and effective method of fertility control in males. Information regarding the possible long-term medical consequences of this procedure is needed.

Projects consider the immunological, endocrine, morphological and physiological consequences of vasectomy in man and in specific animal models suitable for such investigations.

4. Abortion:

Induced abortions as a means of fertility control have become extremely important during the last few years. Projects investigate the relationship between induced abortion and subsequent pregnancy performance, including risks of spontaneous abortion, prematurity, ectopic pregnancy and infertility.

3. Social Sciences Research

Through both grant and contract awards, research is conducted in social sciences concerned with fertility; population growth, movement, and composition; family and women's status; and population policy. Specific areas of research interest include:

1. Interrelations between social change and population size, structure, and distribution, with particular emphasis upon the social, economic, and other determinants and consequences of population change.
2. Trends in fertility as affected by age at marriage, divorce, abortion, and related variables; studies of the interrelationships of fertility and other socioeconomic variables; and the relationship between trends in fertility and broad socioeconomic changes.
3. Interrelations between family structure, sexual behavior and fertility, illegitimacy and abortion; motivations, social pressures, and sex role socialization and definition, etc., which influence the number and spacing of children; decision-making processes related to number of children and contraceptive practice; attitudes toward methods of fertility control, use-effectiveness of various methods, and factors affecting successful use of various methods; and alternatives to child-bearing which couples perceive and how these perceptions affect fertility.
4. Social, economic, and psychological consequences for both parents and children of various childbearing patterns.
5. Policies aimed at regulating population and which indirectly affect population growth or distribution.

B. Center for Research for Mothers and Children

The mission of the Center for Research for Mothers and Children is to support research and training in the biomedical, social and behavioral sciences related to maternal and child health with the objective of improving the

health and well-being of mothers and children throughout their life span, from conception into adulthood. The Center is currently organized into three major program areas to carry out its mission.

1. Perinatal Biology and Infant Mortality Program

The objective of the Perinatal Biology and Infant Mortality Program is to promote a coordinated program of research and training which will enhance understanding and development of knowledge related to pregnancy and maternal health, embryonic development, fetal growth, and infant well being through the first year of life. Efforts are directed also towards reducing this country's infant mortality rate, ameliorating infant morbidity, and narrowing the gap between the identification of new knowledge and its incorporation into the delivery of health care.

Program goals recognize the interrelationships of specific health and developmental problems encompassed in the prenatal, perinatal, and infant periods of life, and the effects that these events may have upon subsequent development and well being of the child. Particularly relevant are those morbidity- and mortality-related maternal health problems which affect fetal and infant health status, problems with which the newly born infant must cope in his adaptation to extrauterine life and subsequent survival and well being, and events occuring during the antenatal period, the period of hospitalization following birth and during the first month of life which can influence the subsequent behavior and development of the baby.

The following are major program areas:

a. Pregnancy and Maternal Health

This area is concerned with those normal and abnormal physiologic factors which influence the gravida state during the antepartum, intrapartum, and puerperium periods. Information is sought about maternal physiology, complications of pregnancy, placental function, factors involving the maintenance of pregnancy, the initiation of labor, the impact of common pollutants, drugs, and anesthetics on the mother and intrauterine conditions, and the psychosocial dynamics of pregnancy.

b. Developmental Biology

This area encourages strategic approaches to prenatal and neonatal health problems through fundamental research concerned with developmental events. Problems at organ, cell and molecular levels relating to low birth weight, susceptibility to infant morbidity and mortality and congenital malformations in the human infant are of high priority.

c. Fetal Health and Development

This area is concerned with basic and clinical problems related to normal and abnormal development of the fetus at the tissue, organ and system levels. Program content focuses on areas pertaining to normal aspects of development as well as to environmental hazards of events of a pathophysiologic nature. Attention is given to nutritional, metabolic and other physiological sequences, immunologic factors, and pharmacological interrelationships between the mother and the developing fetus.

d. Infant Survival and Well Being

This area is concerned with the postnatal period from birth to one year of age. Problems of low birth weight, influences of maternal and environmental conditions and treatments upon adaptation to the extrauterine environment, and maintenance of homeostasis are emphasized.

Basic and clinical studies of the etiology, pathophysiology, therapy and follow-up of conditions and syndromes such as asphyxia, respiratory distress, hypoglycemia, hyperbilirubinemia, anemia, erythroblastosis fetalis, and congenital malformations are supported, as are investigations of the effects of events and therapies during the early days of life on adaptation and subsequent development.

A sub-unit of this program area is devoted to the *sudden infant death syndrome*. It is a broadly based program of research to increase understanding of underlying mechanisms of the syndrome, to discover its probable cause(s), to identify infants at risk of becoming its victims, to explore preventive approaches, to inform the scientific and lay communities about the sudden infant death syndrome, and to stimulate scientists to direct their investigative efforts toward finding the solution to this complex biomedical problem.

2. Growth and Development Program

The Growth and Development Program is concerned with human growth and development from birth through adolescence to maturity. By supporting fundamental research, its goal is to broaden our understanding of the complex interplay of factors that determine and affect the proper emergence and development of the biological, intellectual and social characteristics of the individual.

a. Molecular and Cellular Aspects of Development

This area promotes research concerning the fundamental factors which initiate and control the process of orderly growth and development at the molecular and cellular levels. Research funded in this area is devoted to furthering un-

derstanding of: the structure, function, and mechanism of action of the gene; the initiation and regulation of cellular differentiation; the activity and mechanism of action of enzymes.

b. Physiological and Metabolic Studies of Growth

This area supports research on the development of normal physiological functions. Emphases include: development of hormonal rhythms and their relationships to the psyche and to the environment; maturation of neuroendocrine circuits and control mechanisms; mechanisms of action of human growth hormone; and development of ways to manufacture this critical hormone synthetically.

c. Nutrition

Nutrition interests encompass the role of nutrition on physiological and intellectual development, metabolic processes and behavioral factors associated with obesity, and interactions between nutrition, behavior and environment. Major emphasis is placed on nutritional aspects of cell growth and function, nutritional factors relating to periods of hyperplastic growth in different tissues, and the influence of nutrient intake on physical growth, body composition and performance.

d. Physical Growth

Projects relate to developmental anatomy, cranio-facial growth, skeletal growth, body composition, and studies in population genetics which relate to anatomical development. Population genetics investigations include the use of laboratory animals as models of genetic disorders in man, and projects assessing genotypic and phenotypic variation in human populations.

e. Immunological Mechanisms and Pharmacological Studies in Development

Interests in this area focus on investigations of the immunologic mechanisms used by the human host to combat disease, infectious agents, foreign substances and the ability to recognize his own tissues. Special attention is given to the ontogenetic approach in studying the normal time-linked factors that influence the immune response at various ages during maturation. The action of drugs and drug interactions at different stages in childhood is emphasized. A better understanding of absorption, distribution, metabolism, and excretion of the agent and its intrinsic affinity for the receptor, as well as individual variability in response due to pharmacogenetic effects is being sought.

f. Developmental Behavioral Biology

Concern centers on the biological mechanisms of behavior in its broadest context. Emphasis is given to developmental studies, particularly those that attempt to describe the effects of early experience upon the developing brain and behavior. The neurobiological mechanisms mediating social, emotional-affective and intellective-cognitive behaviors are of primary interest. Studies relating to quantitative assessment of the maturation of sensory functions and perception in the developing infant and child, and their modification by early experience, are also supported. Emphasis is also placed on behavioral genetic studies on psychohormonal functions, cognitive-intellective and social-emotional behaviors.

g. Learning and Cognitive Development

Interest is placed on the learning process, the way individuals acquire, extinguish, or modify knowledge, skills, and habits, or behavior. Major research areas include studies of attention, perception, psychomotor and sensory processes. Also included are investigations of conditioning, discrimination, memory, concept formation and reinforcement. Socialization factors related to motivation and competence are promoted along with biological and behavioral studies of learning and performance.

h. Human Communication Research

Studies promoted relate to the biomedical and behavioral processes that are involved in the development and normal communicative skills of those factors which may interfere with normal development. The role that communication plays in human growth and development is also an area of concern. Current emphasis is on studies of the acquisition and development of such skills as speech, language and reading.

i. Adolescent Development

Five major research areas relating to adolescent development have been selected for emphasis. These include:

i. Biological processes involved in the onset and completion of puberty.

ii. Determination of nutrient requirements, the context of the adolescent growth spurt, rapidly changing metabolism, adolescent pregnancy, and possible relationships between nutritional requirements and endocrine function;

iii. Intellectual development—cognitive changes and events which take place during adolescence;

iv. Adolescent socialization—the way social patterns and social structures help or hinder the adolescent to engage in appropriate role behavior during periods of rapid personal transitions; and

v. Relationships between changing hormonal levels and psychosocial development and behavior during adolescence.

3. Mental Retardation Program

The Mental Retardation Program is the focal point within the NIH for support of research and research training in mental retardation and related aspects of human development, including a wide range of developmental disabilities of social and biological origin. Investigations are directed toward a better understanding of the etiology, epidemiology, pathophysiology, diagnosis and behavioral aspects of mental retardation with a view toward its prevention or amelioration. Basic clinical and applied studies, both animal and human, on a broad spectrum of biomedical, behavioral and social sciences involving retarded subjects and their families and those at risk for retardation are included. Special emphasis is given to collaborative, multidisciplinary programmatic endeavors in prevention and amelioration and cover the entire life span from conception through adulthood.

a. Etiology of Mental Retardation

Understanding the causes of mental retardation is often a prerequisite to the implementation of preventive measures. These may occur singly or in combination and result from biological, social or environmental influences. Areas of interest include the role of biochemical products and processes on deficits in learning, memory and behavior; disturbances to fetal growth and brain development; chromosomal aberrations and genetic disorders; and the multiple social-environmental, familial, cultural and health conditions associated with mental retardation in seriously disadvantaged populations. The complex interaction of biologic and social factors highlights the importance of interdisciplinary research approaches to many to these problems.

b. Pathophysiology of Mental Retardation

Etiologic agents find their expressions in mental retardation through diverse and complex pathways. Biological studies therefore include morphological, histological and ultrastructural aspects of the brain, CNS malformations, sensory defects and their correlates to learning and development. Investigations on the pathogenesis of behavioral and learning deficits focus on stimulus factors; language, hearing, and communication; elements in cognition, perception, memory and motivation, among others.

c. Diagnosis

Many conditions of mental retardation cannot yet be diagnosed, thus impeding efforts at prevention of treatment. Interest in this area includes the refinement of diagnostic and classification systems, techniques and instruments for evaluating intellectual, personality, adaptive behavior and psychophysiological characteristics of retarded subjects. Understanding of these outcomes also requires new or improved analytic procedures for assessing the range of family and social environments in which certain forms of mental retardation are heavily concentrated.

d. Prevention of Primary Retardation

Studies on the prevention of retardation represent one of the major goals of this Program. In the biological sciences, emphasis is directed to methods of detection; antenatal diagnosis; dietary treatment; enzyme replacement therapy; methods of preventing low birth weight and prematurity; and the exploration of other promising intervention techniques. The manipulation of modification of social environmental conditions in disadvantaged populations or infants otherwise at risk also emphasized. This includes studies in infant stimulation, early intervention in the home, in day care and educational settings.

e. Amelioration of Mental Retardation

While prevention is a primary goal, it is equally important to optimize the intellectual and social performance of those already handicapped and to reduce the impact of dysfunction of the family and community. Of interest in this regard are studies on ways to improve performance through sensory-motor and perceptual training; symbolic and linguistic mediation; remedial and programmed instruction and behavior modification. Also relevant to treatment are studies on family interaction patterns; in patterns of care and delivery systems; and the impact of public and professional attitudes on the behavior or retarded persons.

f. Mental Retardation Research Centers Program

The research center program within the MR Program represents a major resource of the Institute and the nation for research and training in mental retardation. These centers—twelve in number—were constructed under a federally legislated program and are geographically distributed throughout various regions of the country. They are long-term legal commitments to research in mental retardation and related aspects of human development, and are uniquely suited to the conduct of multidisciplinary, multifaceted and collaborative undertakings in biobehavioral investigations.

NICHD
Programs and Awards

	Research Project Grants	Program Project Grants	Center Grants	Research Career Development Awards	National Research Service Awards	Research and Development Contracts
A. Center for Population Research						
1. Biomedical Research:						
A. Fundamental Biological Investigations	●	●	●	●	●	
B. Contraceptive Development						●
2. Social Science Research	●	●	●	●	●	●
B. Center for Research for Mothers and Children						
1. Perinatal Biology and Infant Mortality Branch	●	●	●	●	●	●
2. Growth and Development Branch	●	●	●	●	●	●
3. Mental Retardation Branch	●	●	●	●	●	●

NATIONAL INSTITUTE OF DENTAL RESEARCH

The National Institute of Dental Research (NIDR) was established by the National Dental Research Act of 1948. The NIDR mission is "to conduct, assist, and foster researches, investigations, experiments, and studies relating to the cause, prevention, and methods of diagnosis and treatment of dental diseases and conditions." As the chief sponsor of dental research and related training in the United States, the Institute encompasses a broad field of activities and studies, ranging from causes of dental and other oral diseases to the development and application of more effective therapeutic and preventive measures.

Because of their complexity, oral problems must be attacked through a comprehensive program of laboratory, clinical, field, and epidemiological studies in such varied areas as developmental biology, genetics, microbiology, virology, and materials science. In fact, the efforts of over 30 scientific disciplines are today contributing to an ever growing base of information on which NIDR is building improved means to treat and prevent disease.

Special Programs

Dental Research Institutes and Centers.

The Dental Research Institutes and Centers program was initiated in 1967 as a special activity to broaden and strengthen the scientific base underlying the national capability to improve oral health. This program seeks not only to maximize the efforts of the existing dental research capability, but also to develop new programs involving additional scientists from medical, engineering, and graduate schools, as well as other university components. Institutes are expected to build on and extend existing institutional research strengths; provide for participation of multiple disciplines; and facilitate collaboration of a wide range of biological, physical, and social scientists in the study of oral health problems.

This special program currently supports five university-based dental institutes and centers. Although the focus of each institute varies, collectively their efforts cover a broad spectrum of basic and applied oral-facial disease research. Thus, programs at the Alabama institute relate to the etiology, prevention, and treatment of oral diseases with emphasis on connective tissues. The program at Michigan concentrates on periodontal disease, caries, viral diseases, and growth and function of the masticatory apparatus. The North Carolina center conducts research in growth and function of the craniofacial region, in biomaterials, and in pain control. Studies of periodontal disease, caries and the herpes simplex virus are among the projects at the Pennsylvania center. The center at Seattle emphasizes periodontal disease, salivary secretions, and nutrition.

National Caries Program.

Implemented late in FY 1971 as a Presidential special initiative, the National Caries Program is a highly organized research and development effort to reduce the incidence of dental caries. Dental caries is localized, progressive decay of the teeth, initiated by demineralization of the outer surface of the tooth from organic acids produced locally by bacterial fermentation of dietary carbohydrates. Thus, it results from complex interactions involving three factors: the bacteria, the diet and the tooth. The program seeks to modify one or more of the etiologic factors to prevent disease. Program strategy thus focuses on the development of agents that inactivate the microbial process of caries, that increase the resistance of the tooth, or that decrease the potential of the diet to support caries.

Within the framework of these objectives, research will continue to be directed to the physiology of plaque, the development and testing of anti-microbials and pit-and-fissure sealants, and the practicability of a vaccine, the efficacy and mechanism of topical fluorides, the anti-cariogenic effect of dietary additives, and the role of trace elements in caries inhibition. Etiologic processes that remain incompletely defined will also continue to receive emphasis.

The challenging and complex problem of the delivery of preventive methods and their acceptance by the public will also receive increasing attention as a fourth program objective. As part of this effort, studies are planned in health education and motivation, as well as on techniques for predicting costs and benefits of new programs. Demonstration projects of limited duration are also supported under this program objective.

To accomplish its mission, the National Caries Program has developed a special organizational structure which consists of an extramural grants branch, an extramural contracts program, and an intramural research component. It is believed that the combined efforts of these three elements will significantly accelerate the research and development required to accomplish the mission.

Categorical Programs

In addition to the special programs described previously, NIDR supports five categorical programs concerned with the study of dental

diseases and disorders. The objective of each of these disease oriented programs is to develop new knowledge which will lead to the effective treatment, control, and eventual prevention of these conditions.

Periodontal and Soft Tissue Diseases Program.

The program supports research relating to the etiology, pathogenesis, diagnosis, treatment, and prevention of periodontal disease, orofacial ulcerative disorders, oral neoplastic diseases, salivary gland diseases and tumors, and disorders of the dental pulp. To these ends, research is supported in a variety of biomedical disciplines.

Periodontal Diseases: Since periodontal disease seems basically to be a localized host/parasite disease, the microbiological, biochemical, and immunological aspects receive continued emphasis. These studies encompass the identification of bacteria that form periodontal plaque, the biochemical basis of adhesion, the nature of microbial, enzymatic, immunologic and chemical activities that may cause disease, and the means by which plaque formation can be inhibited. Because the principal form of periodontal disease is characterized by chronic inflammation, major focus is on immunopathologic factors. As the result of progress in delineating the pathologic processes, scientists now believe that the constant challenge of plaque makes the patient allergic to his own oral microbes, causing a reaction in the gingival tissues that results in the destruction of the gingival tissues and of the bone supporting the teeth. As precise knowledge of the inflammatory response develops, it may be possible to block these destructive processes.

Oral Cancer: NIDR continues to collaborate with the National Cancer Institute to identify opportunities for studies of oral cancer. Emphasis will continue on the development of methods of mass screening for the early detection of neoplastic diseases of the oral tissues. In addition, virologic and epidemiological studies to obtain information on the causative factors of oral cancer will be encouraged, and studies on the mode of action of various carcinogens in oral cancer will continue.

Oral Ulcerative Diseases: The two major ulcerative disorders are aphthous stomatitis (canker sores) and herpes infections (cold sores or fever blisters). Research focuses on the still elusive cause of aphthous ulcers and on means of treating the lesion. Research plans on herpes simplex include the development of better diagnostic methods, definitive therapeutic measures, and an effective vaccine.

Disorders of the Dental Pulp: Thousands of teeth are lost each year as the result of degenerative changes of the dental pulp following carious lesions, trauma and restorative procedures. Therefore, research will be encouraged to apply biochemical methodology to evaluate new and traditional treatment procedures.

Craniofacial Anomalies Program.

The prevention and control of craniofacial anomalies requires a greater understanding of the growth and development process. Toward this end, NIDR supports clinical research on normal and abnormal oral-facial growth, development, and functions. Emphasis is placed on research pertaining to the etiology and treatment of such anomalies as malocclusion, cleft lip and palate, temporomandibular joint disturbances, neuromuscular disorders, and acquired disfigurements. Investigations of the physiology of mastication, deglutition, speech, oral sensation and perception are also supported. Research in the etiology and treatment of craniofacial malformations encompasses many interrelated disciplines.

Malocclusion: The most common developmental defect in the craniofacial region is malocclusion. Concurrent with research on craniofacial growth and development, NIDR supports laboratory studies on growth prediction, diagnosis and the basic cellular response to orthodontic treatment. Emphasis is placed also on the development of preventive measures and interceptive programs which would enable the practitioner to more efficiently treat most types of malocclusion, thus bringing care within the reach of millions now untouched.

Cleft Lip and Palate: Clefts of lip and palate, which develop in the embryo, cause severe deformity and impairment of function. Research continues to be directed toward determining the best surgical and other habilitative procedures (including psychological and social aspects) and the best timing of treatment. Emphasis is also placed on etiologic factors. Findings indicate that clefts usually result from predisposing genetic or environmental factors operating early in embryonic life.

Other Craniofacial Malformations: NIDR is also beginning to direct research support to a broader spectrum of craniofacial malformations. Less common, but more disfiguring, such anomalies may include a misshapen or partially missing lower jaw or malformed ears; eyes which are excessively set apart and prevent normal vision; and a cranium with sutures that do not grow, thus causing damage to the growing brain and a distortion of the facial structures. Some anomalies may combine these de-

formities with malformations of other parts of the body such as feet and hands.

This broadened scope is timely in view of recent progress in the surgical treatment of severe craniofacial deformities. The new radical surgical procedures, however, have introduced a host of problems related to future form and function and psychosocial adjustment, which requires extensive research.

Pain Control and Behavioral Studies Program.

The NIDR is interested in research on the pain and discomfort associated with dental problems and their treatment, and on the specific pain experienced in a variety of oral-facial syndromes, such as trigeminal neuralgia. The Institute is interested also in behavioral studies on the fear and anxiety syndrome associated with dental treatment and on other oral-facial problems.

Pain Control: Pain involves both objective and subjective components, each of which must be studied separately so that the contribution of each of a specific human pain problem can be assessed. A comprehensive approach requires basic and applied studies in various disciplines, related to neurology and psychology.

Since dental anesthesiology is underdeveloped, there is a need to expand and strengthen the knowledge base in this field. Techniques must be developed which will enable patients to remain conscious, cooperative, and comfortable during dental operations. Current procedures in this area are not standardized, and there is an urgent need to identify the most appropriate drugs for optimum results. The search for better means of controlling pain will also explore new modalities of pain control not involving drugs, such as electrical anesthesia, acupuncture techniques, and other physical methods. Research into the problems of oral-facial sensory responses also is of interest.

Behavioral Studies: In addition to behavioral studies related directly to pain, research is needed on the psychological aspects of a variety of oral-facial problems, ranging from the psychosocial impact of cleft palate on the child and on the family to the psychological factors involved in accepting health care. One long-standing obstacle to oral health is the fear and anxiety which causes millions of Americans each year to shrink away in fear from routine dental treatment. One approach to this problem is to develop fear desensitization techniques applicable to children during early dental experience, so that they would be receptive to dental treatment throughout life. There is also a compelling need for scientific methods to monitor human anxiety levels physiologically and psychologically, so that anti-anxiety treatment for patients of all ages can be improved. In addition, there is a need to train new scientists for research on dental stress and anxiety, on the motivational factors in preventive dentistry, on behavioral and cultural aspects of dental epidemiology, and on the psychosocial and cultural concomitants of dental disease.

Mineralization, Salivary Secretions, and Nutrition Program.

Mineralization: In the mineralization program, support is provided for studies of mineral metabolism, normal and abnormal calcification mechanisms, and connective tissue matrices. Subjects of interest are (a) combined morphologic and biochemical aspects of mineralizing systems, (b) relationship of cellular metabolism to the control of mineralization, (c) compartmentalization concept in bone and teeth, (d) composition of mineralizing connective tissues, and (e) initiating and regulatory factors of mineralization and demineralization.

Salivary Secretions: Since salivary secretions are important factors in maintaining the health or oral tissues, NIDR supports research on the structure and function of the glands and on the composition and function of the secretions in health and disease. The program supports specific studies on the embryogenesis, morphodifferentiation, cell transformation, secretory transport and other biological processes within the gland, and on proteins and other constituents of the secretions.

Nutrition: NIDR supports nutrition research to obtain a better understanding of the role of poor nutrition as an etiologic factor in oral disease, and the role of sound nutrition as a preventive measure. Population or epidemiologic studies, laboratory studies using model systems, and human clinical studies are encouraged. Of particular interest are studies to assess the effect of nutritional deficiencies and excesses on (a) the immune response, (b) the integrity of the oral mucous membrane, (c) the protective function of salvia, (d) tooth development (e) bone resorption, and (f) periodontal disease.

Restorative Materials Program.

The objective of this program is to develop new and improved materials to repair damaged oral tissues, to restore function and appearance, and to prevent oral disease. Support is provided to investigators working in the physical and biological sciences to achieve these aims.

The program endeavors to develop and test (a) restorative materials for repairing the dam-

age from dental diseases, (b) adhesive sealants for protecting tooth surfaces against decay and for sealing the margins of filling, (c) maxillofacial prostheses for repairing birth defects or deformities resulting from cancer surgery or accidents, (d) artificial tooth implants to provide either replacements for missing teeth or posts to anchor bridges or complete dentures in place, and (e) diagnostic and treatment devices.

Current emphasis is placed on implantology, maxillofacial prostheses, and adhesive sealants. In the area of implantology, a number of candidate materials, designs, and procedures are now being evaluated in animals. Studies to assess the influence of the chemical composition of the tooth implant, and the influence of grooves, slots, and porosity, on implant acceptability and retention are also being encouraged. In the area of maxillofacial prostheses, NIDR is supporting the development and testing of materials specifically for use as artificial skin.

An increasing amount of interest is being given to the use of sealants as a protective measure for tooth decay. The optimum material has not been identified however, and the conditions for initial application, and for reapplication have not been determined.

Award Mechanisms

Grants.

The National Institute of Dental Research utilizes all of the traditional project grant mechanisms to support research of relevance to the Institute programs. While grant applications must be formally initiated by the investigator, proposals in an area of need may be stimulated by staff communications. The Institute employs grants to support research in all of the categorical programs, in the special Institutes and Centers Programs, and in the national Caries Program.

Special Grants: The NIDR also administers a special research grant program which provides limited funds ($10,000 per year) to newly-trained scientists for the conduct of independent investigators during the formative stages of their careers. These Special Dental Research Award (SDRA) grants are made for meritorious projects, either basic or clinical, which relate to such areas as periodontal, soft tissue, and oral neoplastic diseases; dental caries; craniofacial anomalies; dental pain; mineralization, salivary secretions, and nutrition, and restorative and prosthetic materials. Like all NIH research grants, SDRA's are reviewed for scientific merit by an NIH Study Section. The National Advisory Dental Research Council undertakes final review.

To apply for an SDRA, use the regular research grant application, Form, NIH 398, and write "Special Dental Research Award" on the top of the face page. Forms and additional information are available from: Extramural Programs, National Institute of Dental Research, National Institutes of Health, Room 503, Westwood Building, Bethesda, Maryland 20014.

Contracts.

Contracts are awarded for research projects which fulfill a specific program need and are generally of an applied nature. With contracts the initiative to conduct the project originates within the Institute, and the nature of the project is such that close monitoring of its progress is required. The contract mechanism is also used to extend and expand ongoing NIDR in-

NIDR Programs and Awards

	Project Research Grants	Program Project Grants	Center Grants	Special Dental Research Awards	Research Career Development Awards	National Research Service Awards	Research and Development Contracts
Dental Research Institutes	●	●	●		●		
National Caries Program		●	●	●		●	●
Periodontal and Soft Tissue Diseases Program		●	●	●	●	●	●
Craniofacial Anomalies Program		●	●	●	●	●	●
Pain Control and Behavioral Studies Program		●	●	●	●	●	●
Mineralization, Salivary Secretions, and Nutrition Program		●	●	●	●	●	●
Restorative Materials Program		●	●	●	●	●	●

tramural projects. A substantial portion of the research and development in the National Caries Program is awarded by contracts. Other categorical programs use this means to a lesser extent. Investigators desiring information about NIDR contract research should address inquiries to the Office of Collaborative Research, NIDR, NIH, Room 557, Westwood Building, Bethesda, Maryland 20014.

Training Awards.

Under the authority of the National Research Act, NIDR uses the Individual and the Institutional Grants for National Research Service Awards (predoctoral and postdoctoral) which are the principal forms of manpower support at NIH as a whole.

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES

Missions

The National Institute of Environmental Health Sciences (NIEHS) serves as a national resource and focal point for environmental health research. Its mission is to develop understanding of the etiologic factors and biological mechanisms involved in human diseases and disorders of environmental origin, and to increase the supply of environmental health research manpower in accordance with identified national needs. In addition to the general contribution to biomedicial and clinical knowledge, the research is intended to provide health criteria for the establishment of standards by those Federal agencies charged with regulatory responses. Other beneficiaries of the basic knowledge developed are medical personnel concerned with the etiology of new diseases peculiar to certain locales, research teams dealing with environmental components of various diseases, defects and disorders, and physicians responsible for health care delivery. The Institute maintains close liaison with the academic and medical communities, other Federal agencies, and certain other countries through established international exchange programs.

General Programs

Because of the numbers and kinds of environmental factors to which man is exposed, the scope of activities is very broad. Efforts are made to maintain an effective blend of problem oriented and fundamental sciences. For administrative purposes the research is divided into four primary Program areas: (1) Etiology of Environmental Diseases and Disorders. (2) Environmental Pharmacology and Toxicology, (3) Environmental Pathogenesis, and (4) Environmental Mutagenesis and Reproductive Toxicology. None of these is rigidly delineated or mutually exclusive. Research and training may span one, several, or all Program areas concurrently.

Etiology and Environmental Diseases and Disorders. The objective of the Etiology Program is to identify and to understand the causal associations between hazardous chemical, physical and biological factors in man's environment and human morbidity and mortality. Factors of interest include pesticides, plastics, and their intermediates, food additives, solvents, and other synthetic chemicals; metals and metal compounds; asbestos, coal, plastics and other noxious inorganic and organic dusts; toxins of natural origin; light, temperature, electromagnetic radiation, noise, etc., regardless of their sources or modes of dissemination. Drugs as commonly defined and radiation from radionuclides are excluded except as they may be involved in synergistic or antagonistic actions with environmental agents or serve as useful models for the study of environmental agents.

In addition to its general responsibilities in this Program area, the Institute has a special responsibility for health research related to energy development and conservation. It seeks to identify health effects and to provide predictive capabilities regarding such effects associated with pollutants from new and existing energy technologies and conservation measures being expanded in the nation's efforts to achieve energy self-sufficiency. Research priorities take into account suspected health impacts of hazardous agents from proposed technologies on the general population and on specific population groups, gaps in knowledge concerning health effects, and projected time frames for development of the various energy sources. Hazardous agents of concern include, but are not limited to, (a) native components of coal and petroleum, (b) gaseous and solid by-products of combustion, (c) vapors and compounds of heavy metals contained in fossil fuels, and (d) noxious dusts originating from mining and processing operations and the production and use of insulating materials. Priority is given to research that will lead to (a) development of more sensitive and rapid physiological indicators to evaluate damage to man, (b) quantification of relationships between exposure to toxic agents and diverse behavioral and biological effects, and (c) identification of damage to cells and cell components as early indicators of injury to highly susceptible individuals and population groups.

Environmental Pharmacology and Toxicology. The goal of the Pharmacology-Toxicology Program is to develop understanding of the pharmacological principles that govern the site and severity of damage by environmental agents. The focus of the research is upon the process by which environmental agents affect biological systems and by which biological systems, in turn, influence the action and fate of debilitating agents. The roles of age, sex, nutrition, current and antecedent diseases, and enzymatic, immunologic and genetic factors in the modification of these processes are an integral and important aspect of the studies. Mechanisms of additive, synergistic and antagonistic interactions between combinations of agents and tests of validity of usefulness of the concepts of "threshold" and "no threshold" effects are also areas of primary interest. Systems of concern may be organized at the molecu-

lar, subcellular, cellular, tissue, organ, organismic, or population levels.

Environmental Pathogenesis. The Pathogenesis Program deals with the details and time sequence of molecular, structural and functional changes that eventually result in morbidity or mortality. Environmentally related changes in various body systems and degenerative disorders of complex and long-term etiology have been documented and are subjects of active research. Efforts are being made to define the early changes at threshold effect levels of toxicants to facilitate development of early indicators of damage before the disease process becomes irreversible. Additional important aspects of the program include selection and validation of animal species more representative of man for specific disorders; development of better chemical and physical test procedures for indicating incipient disease and for evaluating the extent of pathology at specific sites; and development of mathematical and test models that will afford predictive capability regarding human risk and permit low dose extrapolation of data from experimental systems to man.

Where there is sometimes a degree of overlap in the Program with certain program elements of other Institutes, NIEHS has primary responsibilities only when the focus and emphasis of the research is on the processes by which environmental agents induce disease and not on the organ or tissue *per se.*

Environmental Mutagenesis and Reproductive Toxicology. The overall goal of this program is to safeguard the genetic heritage, the reproductive capacity, and the well-being of the progeny of man against environmental toxicants. Specific objectives are (1) to clarify the nature and structure-activity relations of chemicals in air, water, food, and various special risk environments capable of altering or adversely affecting human genetic makeup, reproductive capability, or the embryo or fetus, (2) to develop reliable test systems with unequivocal quantitative relevance to man for detection and quantification of mutations and teratological defects, and (3) to elucidate molecular and cellular mechanisms in mutagenesis and reproductive anomalies.

Towards these goals the Institute seeks to develop mutagenesis and teratogenesis test methods and systems which are less time-consuming, complex, and costly, and to devise theoretical and practical ways of translating results from such tests to man. Improvements in systems involving *Drosophila* spp., host mediated assays, cultured cell transformations, radiation sensitive mutants, and protein and enzyme changes are sought which will broaden the applicability and sensitivity of the tests and make them more meaningful in terms of identifying human risks. Parallel efforts are being made to find reliable direct indicators for man, including methods for detection of changes in readily available body fluids and cellular fractions. Such studies include elucidation of the frequency and mechanism of various types of mutations and relationships between the chemical and physical properties of mutagens and teratogens and their effects on genetic and regulatory systems. DNA repair mechanisms are studied to establish quantitative relationships between mutagenesis and teratogenesis and environmental levels of specific agents.

Award mechanisms in all Program areas include Research Project and Program Project Grants and Research Career Development Awards. Research contracts, training awards and University-based Center Grants are also supported under circumstances and for the purposes indicated on the following pages. In addition, the Institute will support a limited number of timely, well-focused conferences that serve to examine and evaluate information about highly relevant and important environmental problems in order to identify research needs and provide direction for research programs.

Research Contracts

The National Institute of Environmental Health Sciences awards research contracts when the research cannot be conducted within the facilities of the Institute, the need for such research is identified by the NIEHS staff, and the work represents extension of some well-delineated aspects of ongoing programs. The areas encompassed by contracts therefore parallel and complement intramural projects. Intramural programs are characterized by sharp focus in areas of recognized research needs not adequately covered or developed in academic institutions or other government agencies. Briefly, these areas include aerotoxicology, pharmacological and toxicological actions of hazardous agents in the lungs, influences of age, sex and other factors on toxication, detoxication and defense systems, mutagenesis, reproductive toxicology, teratology, biometry, environmental biophysics, and development of test methodology and systems.

Research Training

NIEHS research training awards are of two types, i.e., Institutional Grants for National Research Service Awards, supporting both pre- and postdoctoral trainees if either or both levels of training are justified in the application and approved; and Individual National Re-

search Service Awards, for specified training in environmental health and related sciences. Applications will be accepted by NIEHS in the research areas of (1) Environmental Biology, (2) Environmental Epidemiology and Statistics, (3) Environmental Pathology-Pathophysiology, and (4) Environmental Toxicology. Emphasis in Environmental Biology will be on the development of methods of testing and evaluating the mutagenicity and teratogenicity and environmental agents in laboratory animals and human individuals and populations.

The backgrounds of individuals who wish to enter any of the programs may be from one or more disciplinary areas. Training sites (sponsors) must have demonstrated a major commitment to an ongoing research program in an environmental health sciences area consistent with the mission of NIEHS.

For individual awards the following factors should be considered by the applicant and the sponsor in developing program plans: (1) supplementation of doctoral education and specialized experience with course work on training in other relevant disciplinary areas sufficient to provide an understanding for effective collaboration, (2) development of additional relevant research experience on problem oriented subjects in environmental health sciences, (3) location of the trainee in an area geographically accessible to other ongoing research activities in environmental health sciences, and (4) seminar, scientific meeting, and library activities directed toward a broadened understanding of environmental health problems.

Special Programs

University-based Center Grants

University-based Center Grants are an integral part of the strategy of NIEHS in serving optimally the national needs of environmental health sciences research and training. They integrate the efforts of scientists in several traditional disciplines and foster applications of expertise across disciplinary lines to environmental health problems. The Centers are made up of scientists who collaborate to develop fundamental and practical information about the causes and nature of environmentally related diseases. The programs are generally broad, encompassing all or most of the NIEHS Program areas described above. Additionally, the Centers are located in teaching institutions selected for their ability to attract and train gifted students in environmental health and related sciences.

Center Grants usually evolve within the University as a result of integration of a number of highly productive research or program projects and training activities relevant to the Institute's mission. The Center is characterized by a unity of purpose and a central administration under a Center Director, though the specific research interests of participants may be diverse. Funds are provided for administrative costs, capital equipment, general services, and core support which may be used to fill gaps in essential staff and to explore new and urgent problems as they emerge. It is expected that the University will provide long-term commitment of physical facilities and staff to foster effective operation and development of the Center consistent with national health needs.

NIEHS Programs and Awards

	Research Grants	Center Grants	Research Career Development Awards	National Research Service Awards	Research and Development Contracts
Etiology of Environmental Diseases and Disorders	●	●	●	●	●
Environmental Pharmacology and Toxicology	●	●	●	●	●
Environmental Pathogenesis	●	●	●	●	●
Environmental Mutagenesis & Reproductive Toxicology	●	●	●	●	●
Special Programs		●			

Inquiries regarding grant activities of the National Institutes of Environmental Health Sciences should be directed to Associate Director for Extramural Programs, NIEHS, P.O. Box 12233, Research Triangle Park, North Carolina 27709.

Inquiries regarding contracts should be directed to Office for Program Development at the same address.

NATIONAL EYE INSTITUTE

I. Institute Mission

The National Eye Institute conducts and supports research and research training related to the prevention, etiology and pathogenesis, diagnosis, and treatment of eye diseases and disorders of the visual system. Laboratory and clinical research efforts are funded within the following major Program areas: (1) Retinal and Choroidal Diseases; (2) Corneal Diseases; (3) Cataract; (4) Glaucoma; and (5) Sensory and Motor Disorders of Vision. Within each of the Institute's major Program areas, research may range from an attempt to elucidate a fundamental biological process which may underly various disease conditions, to the development and testing of a specific therapeutic technique.

II. General Programs

1. Research Project Grants and Contracts

The research project grant, awarded to an institution in the name of a principal investigator for a discrete project, is the primary instrument of support for studies supported by the Institute. The project grant supports discrete, circumscribed projects generally conceived by an individual scientist.

If specific areas of research have been targeted for increased attention, requests for applications (RFA's) for research project grant support in these areas may be issued by the Institute. When a common research protocol is utilized by a number of clinics participating in an evaluative study, or a collaborative effort is undertaken between the Institute and another organization, one or more contracts may be negotiated.

2. Individual National Research Service Awards

Support of postdoctoral research training in specified laboratory and clinical sciences related to eye diseases and disorders of the visual system is available through *National Research Service Awards*. These grant awards are made to individual applicants, for specified training proposals, selected as a result of national competition.

3. Institutional Grants for National Research Service Awards

The NEI is also authorized to make institutional grants for *National Research Service Awards*. These grants are designed to support postdoctoral and postresidency research training programs as described below:

(1) Postdoctoral Research Training

A. Trainees must hold a Ph.D., M.D., O.D., or equivalent degree.

B. The training must be designed to provide each trainee with a minimum of two (2) years of full-time research training in one or more of the following areas:
Immunology
Genetics
Pharmacology
Epidemiology
Physiology & Biochemistry
Developmental Biology
Psychophysics & Physiological Optics

(2) Post-Residency Research Training

a. Trainees must have completed residency and clinical training in ophthalmology.

B. The training effort must be designed to provide each trainee with a minimum of two (2) years of full-time research training.

C. Although research training may be provided in laboratory or laboratory and clinical areas, preference will be given to those applications that emphasize two (2) years of full-time laboratory research training.

III. Special Programs

1. Research Career Development Awards

The Institute accepts applications for Research Career Development Awards, designed for individuals with clear research potential who require additional research experience in a productive scientific environment in preparation for careers in independent research. Nominees should not be more than 10 years beyond the attainment of the last doctoral degree on the day the application for an award is received by the NIH.

Awards are limited in number and are made only to those individuals holding an active NEI research grant or contract, or who have successfully competed for NEI research support for which an award may be issued concurrent with the Research Career Development Award. NEI research grants or contracts held by the applicant must have a minimum of three (3) years of support remaining at the time the Research Career Development Award is activated.

2. Academic Investigators Awards

These awards are designed to facilitate the development of academic faculty in clinical or laboratory sciences related to disease of the eye and the visual system. They enable the promising young biomedical scientist to obtain laboratory research, clinical research, and teaching experience appropriate to the development of academic leadership. For this effort to be successful, there must be an institutional commitment to strengthen research and academic ac-

tivities related to the visual sciences in that institution. The Academic Investigator Award assists in this commitment by enabling awardees to become established in laboratory and clinical visual sciences as investigators and educators.

To be eligible for these grants, candidates must be nominated by an institution in which the candidate holds an academic appointment. The candidate must have a M.D., Ph.D., O.D., or equivalent degree. Candidates should have from three to seven years of postdoctoral research training or residency requirements will be considered as having met postdoctoral requirements. In addition to demonstrated potential, candidates must have a commitment for excellence in research and teaching and for an academic career. Since research training is an important consideration for this award, preference will be given to those candidates whose application proposes a minimum of two (2) years' laboratory research training.

3. Special Visual Sciences Research Awards

The Special Visual Sciences Research Award of the National Eye Institute is designed to encourage newly-trained investigators to remain active in eye research during the formative stage of their career. These grants may provide limited funds (up to $7,500 p.a. for equipment, supplies or technical supports services only) for costs directly related to conducting approved research projects.

To be eligible for this award, candidates must have received a doctoral degree or have completed residency training no more than four years prior to the date NIH receives a completed application.

4. Research Center Grants

Research Center Grants from the National Eye Institute are available on a competitive basis to institutions in which a substantial volume of high quality, on-going research in the visual sciences is conducted by investigators holding their own NIH research grants. The research may involve laboratory, clinical, or a combination of laboratory and clinical studies.

The primary objectives of the Research Center Grants are to: permit researchers greater freedom, flexibility and independence by integrating common requirements for research resources and support services; enhance the research capability and productivity by stabilizing and strengthening the research environment; facilitate multidisciplinary research approaches to the visual sciences; and promote interaction and collaboration between visual researchers and scientists in university departments outside the visual sciences.

These objectives are met primarily through the provision of funds for centralized or "core facility" research resources and support services. Salary support for professional staff is ordinarily not allowable. Funds may be provided, however for the salary of a newly recruited investigator for a period of approximately twelve months. This allows the individual the opportunity of seeking other support, such as a research project grant. Funds may also be requested for exploratory or pilot studies. Travel expenses are not ordinarily chargeable to a NEI center grant.

While a center grant does not provide direct funding for on-going research as such, the evaluation of an application for a center grant must rest on the scientific merit of all the research benefitting from the proposed core resources and services, and on a record of demonstrated excellence, originality, and productivity. Other key elements in the evaluation of an application for a Research Center Grant are: qualifications of the director and of the investigators who would benefit by the grant; organization and administrative structure of the proposed program, including the clarity with which lines of authority and organizational interrelationships are established; and adequacy of plans for intra-institutional review, advice, and consultation.

5. Specialized Clinical Research Center Grants

NEI Specialized Clinical Research Center Grants are available on a competitive basis to academic and other non-profit research institutions interested and capable of conducting clinical research related to the causes, diagnosis, treatment, and prevention of specific eye diseases and disorders of the visual system. The center grants are designed primarily to facilitate the application of scientific methods to the achievement of Institute Program objectives in those areas of research involving outpatients. The objectives of the NEI in supporting a limited number of Specialized Clinical Research Centers are: to foster investigations where humans are studied either because the problem may be peculiar to man alone or because observations on animal models have developed to a point where clinical trials are necessary and appropriate; to focus research resources, facilities, and manpower on particular disease problems; to encourage interaction and collaboration between laboratory and clinical investigators; and to facilitate the application of laboratory research findings to clinical problems.

Each center will be responsible for developing an integrated array of activities with clearly defined research objectives and protocols that

reflect the investigator's research interests, talents, and resources, but that also conform with NEI Program objectives as outlined above.

Funds requested for clinical research center grant support may include (a) clinical research expenses unique to the proposed research projects, including salaries, equipment, supplies, and those outpatient expenses specifically identified as research costs and which are required for conduct of the proposed research; (b) costs of laboratory and animal studies conducted in direct support of the proposed clinical research; and (c) costs for feasibility studies.

IV. Inquiries

The National Eye Institute encourages applicants to discuss with extramural staff any questions they may have regarding the mission of the Institute or the format or grant or contract proposals. Information regardine NEI programs may be obtained by contacting: Scientific Programs Branch, Building 31, Room 6A–52, National Eye Institute, National Institutes of Health, Bethesda, Maryland 20014

In order effectively to provide structure and guidance for the development of the nation's vision research effort, the Institute seeks to maintain a continuing dialogue with investigators regarding all program planning activities. To foster this objective, the Report of the National Advisory Eye Council's Vision Research Program Planning Committee (DHEW Publication No. (NIH) 75–665) is available on request to the Office of Scientific Reports, National Eye Institute, National Institutes of Health, Building 31, Room 6A27, Bethesda, Maryland 20014.

NEI Programs and Awards

	Research Project Grants	Research Center Grants	Specialized Clinical Research Center Grants	Research Career Development Awards	Academic Investigator Awards	Special Visual Sciences Research Awards	National Research Service Awards	Research and Development Contracts
Retinal and Choroidal Diseases	●	●	●	●	●	●	●	●
Corneal Diseases	●	●	●	●	●	●	●	●
Cataract	●	●	●	●	●	●	●	●
Glaucoma	●	●	●	●	●	●	●	●
Sensory and Motor Disorders of Vision	●	●	●	●	●	●	●	●

NATIONAL INSTITUTE OF GENERAL MEDICAL SCIENCES

The National Institute of General Medical Sciences supports research and research training in the basic or general biomedical sciences which have significance for two or more NIH institutes or are outside the general area of responsibility of any other institute.

Institute activities are organized and conducted through its five operating programs: Pharmacology-Toxicology, Biomedical Engineering, Clinical and Physiological Sciences, Genetics, and Cellular and Molecular Basis of Disease. Interprogram cooperation is stressed because projects and developments in one program frequently are relevant and of consequence to others. Each program fosters and supports multidisciplinary approaches and resources, employing the full range of support mechanisms—research project grants, program-project grants, research center grants, career development awards, and institutional and individual fellowships. Additionally, contracts are let to achieve specified objectives in collaboration with industrial organizations or nonprofit institutions, resulting from either solicited or unsolicited proposals.

Cellular and Molecular Basis of Disease Program

This program is devoted to greater understanding of the function of human cells in terms of ultrastructure, with the basic premise that many forms of human disease occur ultimately as the direct result of disturbed or abnormal function of cells. Investigations receiving support are broadly concerned with the biophysical and biochemical description and analysis of molecular events in normal and diseased cells, and the structure and function of cell organelles and membrane processes at molecular and subcellular levels. Areas of research emphasis include: (1) detailed submolecular structure and function of enzymes, other proteins, and other biological substances; (2) development of knowledge of subcellular organelles and their constituents into more precise concepts of how the cell functions as a unit; (3) cell-cell interactions during morphogenesis; (4) mechanisms by which enzymes bring about their catalytic effects; (5) elucidation of the relationship between chemical structure and biological activity.

Molecular Pathology Centers

These centers are conceived as bringing together, under the focus of a general pathologic problem, several basic medical science disciplines and approaches in the study of disease.

The past two decades have provided a new set of ideas and instruments for the study of disease at the subcellular and molecular levels of organization. Many of these advances have resulted from basic biologic research on subcellular structures such as lysosomes, mitochondria, microtubules, and membranes. Pathologists now are able to identify structural and biochemical changes at the subcellular and molecular levels that are characteristic of specific diseases. The new program of Molecular Pathology Centers seeks to promote increased collaboration among pathologists, biochemists, biophysicists, electron microscopists, and other scientists investigating related subcellular phenomena in more quantitative molecular terms. This is expected to enhance and speed understanding of the cellular and molecular basic of disease.

Contact: CMBD Program Director, Westwood Building, Room 903, National Institutes of Health, Bethesda, Maryland 20014.

Genetics Program

This program is directed towards gaining a better understanding of the fundamental processes and mechanisms of inheritance in health and disease. Its objectives are the prevention and improved treatment and care of genetic ills in man, including multifactorial diseases with a strong hereditary component, such as diabetes, atherosclerosis, hypertension, and schizophrenia. The various categorical NIH institutes appropriately consider the treatment of individual diseases as discrete problems requiring a specific approach and resolution. In contrast, the NIGMS Genetics Program attempts to exploit broadly strategic research opportunities which may yield generalizable concepts. Supported research ranges from studies on nucleic acid chemistry to population genetics. Topics include the organization, transmission, and expression of genetic information. Lower organisms, such as bacteria, are used as model systems to elucidate basic genetic principles. At the other end of the spectrum, the techniques of mammalian cell culture are being exploited for the mapping of human genes and for the study of basic biochemical defects underlying human genetic diseases. Also of concern are the legal, social, and moral implications of new genetic knowledge, such as assessment of the effects and effectiveness of genetic counseling.

NIGMS Genetics Research Centers

This center program was established to foster interaction among scientists involved in basic and clinical research. In these centers, the clinical evaluation of research findings has been

greatly facilitated. These centers provide abundant numbers of patients for study and a setting in which research findings can be clinically evaluated.

The centers facilitate broadly based research that is likely to contribute significantly to the solution of human disease problems. New ideas and progress are engendered by familiarizing basic scientists with specific human genetic problems. The concept includes basic laboratory investigation and clinical genetics support as each relates to the overall goals.

Contact: Genetics Program Director, Westwood Building, Room 918, National Institutes of Health, Bethesda, Maryland 20014.

Pharmacology-Toxicology Program

The world we live in is dominated by drug actions and reactions, if drugs are defined broadly as non-food chemicals-therapeutic and nontherapeutic. The objective of the Pharmacology-Toxicology Program is to deal primarily with *therapeutic* drugs. The program ranges in scope from the synthesis of new drugs, to basic studies in the molecular and cellular mechanisms of action, to rigidly controlled clinical studies in man. Support is provided for research on the absorption, metabolism, distribution, and excretion of drugs in man; on factors influencing bioavailability; and on the development of improved surveillance of adverse reactions to drugs. The program also supports areas of medicinal chemistry, including the chemistry of natural products, chemical aspects of biological processes, relationships between chemical structure and biological activity, and chemical methodology. Increasing emphasis is being placed on clinical, especially pediatric, pharmacology and on the development of new methodology and analytical techniques.

Pharmacology-Toxicology Research Centers

University-based centers in pharmacology-toxicology provide discrete central research facilities and resources, at the core of which are teams of basic research scientists, pharmacologists, toxicologists, medicinal chemists, and physicians, who investigate problems relating to rational pharmacotherapeutics, cutting across all disease categories. This network of centers creates a unique national resource for the development of knowledge concerning the safety and efficacy of drugs and the ultimate application of this knowledge to the treatment of diseases of man.

Contact: Pharmacology-Toxicology Program Director, Westwood Building, Room 9A05, National Institutes of Health, Bethesda, Maryland 20014.

Clinical and Physiological Sciences Program

The goal of this program is to strengthen the scientific base of those areas of clinical science for which the Institute is responsible, in order to improve patient care. Support for coordinated basic and clinical investigations relating to trauma and burn research and anesthesiology is intended to foster a more rapid application in clinical practice of new basic research areas. Trauma and burn research is directed to the discovery of better ways to prevent death from injury, mitigate pain, speed recovery of patients and lessen the extent of disabilities caused by injuries. A better understanding of the total body response to trauma is sought. This includes the biochemical and physiological changes induced by trauma, and the fundamental aspects of wound healing and biological repair. Emphasis is also given to research on the treatment of post-traumatic infections, the nutritional requirements of convalescing victims, and rehabilitation of injured patients. Research in anesthesiology is concerned with the mode of action of inhalation anesthetics and muscle relaxants, the nature and control of pain, basic physiologic and metabolic changes resulting from anesthesia, management of respiratory failure, obstetrical and neonatal resuscitation, handling of postoperative respiratory complecations, and pulmonary and systemic effects of drowning. Support is provided also for studies in epidemiology, and in behavioral sciences related to trauma and analgesia.

Trauma and Burn Research Centers

In severe trauma, the injury results in the breakdown of the normal protective barriers leading to sequential organ failure with resultant sepsis, hemorrhage, and other threats to life. The search for better methods of resuscitation depends on a better understanding of the mechanisms of injury and of the compensatory physiological and biochemical processes.

These multidisciplinary centers currently are involved in studies on energy exchange and metabolism, cellular and subcellular changes in shock, pulmonary physiology and patient monitoring, endocrine responses, sepsis, and burns. Although each of the centers uses a different approach to the study of trauma, they all:

- perform basic laboratory investigations which may be brought to the bedside for immediate clinical application, and
- provide the environment for active teaching and training in the care of severely injured patients.

Anesthesiology Research Centers

The anesthesiology research centers encom-

pass both basic and clinical research on the uptake, distribution, and mode of action of anesthetic agents, relief of pain the management of respiratory failure, resuscitation, and intensive care. The centers foster closer collaboration between pharmacologists, physiologists, and anesthesiologists and seek to broaden the scientific base of anesthesiology.

Contact: Deputy Director, NIGMS, Westwood Building, Room 925, National Institutes of Health, Bethesda, Maryland 20014.

Biomedical Engineering Program

This program encourages and supports the application of engineering knowledge to problems in fundamental and applied biomedical research, directed in part to the development of new instruments and devices useful in medicine and health services delivery. In the latter instance, objectives are to advance and automate clinical laboratory analytical processes and to improve upon diagnostic radiology techniques for visualizing fundamental disease processes, emphasizing such measures as ionizing radiation, radio isotopes, thermography, and ultrasound. More basic goals are to enhance the exploration of life processes at molecular levels, and to apply engineering control theories to studies of physiological processes. Development of microelectronic instrumentation for research and patient care purposes is encouraged, as is the use of computer technologies in medical data processing and clinical decision making. This work encompasses the development of new systems for data acquisition and display involving new types of transducers and integrated circuitry, and the development and application of mathematical models of physiological systems to predict more accurately and rapidly the clinical status of acutely ill patients. Research in areas of biomechanics and biomaterials is also supported.

Biomedical Engineering Research Centers

In the past ten years the Biomedical Engineering Program of the National Institute of General Medical Sciences has matured into one of national significance for health. Over the next several years the Institute will gradually undertake a grant-supported program of biomedical engineering research centers to exploit further the growing relationship between engineering, biology and medicine. Over the next five years it is expected that some six to ten centers will be established.

It is anticipated that these centers (1) will usually be multidisciplinary and multidepartmental; in some instances they will stimulate the evolution of new linkages and institutional forms between engineering and medical schools; (2) will represent a scientific focus (as instrumentation research and development, biomaterials, biomechanics) in which a cluster of problems can be defined and to which solution are being sought; (3) may serve as regional foci for special-purpose research and development.

With the passage of time, it is intended that these centers will contribute to a clearer definition of the basic nature of the interrelationship between engineering and biomedicine and a continuing assessment of the areas of greatest potential for the application of engineering concepts and practice to biomedicine.

Diagnostic Radiology Research Centers

In these centers, special attention is given to the development of instrumentation in radiation and nuclear medicine to improve the sensitivity, selectivity, and accuracy of diagnosis and treatment for the millions of people who are annually referred for such services.

Several kinds of research are clearly defined in the centers. These include studies using ionizing radiation, radioactive isotopes, investigation of structure and function in disease. Another area of interest is the development and evaluation of new diagnostic equipment and contrast agents. The radiologic examination itself has been analyzed as to efficiency in diagnostic techniques and methods of reporting results.

Contact: Biomedical Engineering Program Director, Building 31, Room 4A51, National Institutes of Health, Bethesda, Maryland 20014.

Minority Access to Research Career (MARC) Program

Special fellowships are provided under this program to improve research training and increase the number of minority group biomedical scientists. MARC Faculty Fellowships are awarded to selected full-time faculty members of four-year colleges, universities, and health professional schools in which student enrollment is drawn substantially from ethnic minority groups. Applicants must be nominated by their institutions and are expected to return to do research and teach at the sponsoring institution after completion of the fellowship. Another type of support is the MARC Visiting Scientist Fellowship, awarded to assist outstanding scientist-teachers to serve in the capacity of visiting scientists at eligible minority institutions.

The MARC Program, which is being administered in collaboration with the National Cancer Institute, complements the Minority Biomedical Support (MBS) Program of the NIH Division of Research Resources, in which funds are

granted directly to minority institutions to strengthen both bioscience faculties and teaching facilities.

Contact: MARC Program Director, Westwood Building, Room 9A18, National Institutes of Health, Bethesda, Maryland 20014.

NIGMS Programs and Awards

	Research Project Grants	Program Project Grants	Research Center Grants	National Research Service Awards	R&D Contracts Studies & Resources
Cellular and Molecular Basis of Disease		●	●	●	
Pathobiology	●				
Cell Structure and Dynamics	●				
Membrane Structure and Function	●				
Enzyme Catalysis and Replication	●				
Proteins and Macromolecules	●				
Biomolecular Models and Mechanisms	●				
Genetics		●	●	●	●
Nucleic Acids	●				
Replication, Transmission, and Fidelity of Genetic Information	●				
Genetic Expression	●				
Clinical Genetics	●				
Population Genetics and Gene Mapping	●				
Social, Ethical, and Legal Aspects of Genetics	●				

	Research Project Grants	Program Project Grants	Research Center Grants	National Research Service Awards	R&D Contracts Studies & Resources
Pharmacology-Toxicology		●	●	●	●
Pharmacology-Toxicology	●				
Bio-Related Chemical Processes	●				
Clinical and Physiological Science					
Anesthesiology	●	●	●	●	
Trauma and Burns	●	●	●	●	
Behavioral Sciences and Adaptation	●	●		●	
Epidemiology	●	●		●	
Biomedical Engineering		●	●	●	
Mathematical Methods	●				
Physiological Control	●				
Artificial Organs	●				
Instrumentation	●				
Computers	●				
Patient Monitoring	●				
Biomaterials and Biomechanics	●				
Automation of the Clinical Laboratory	●				●
Diagnostic Radiology	●	●	●		
Minority Access to Research Careers [MARC]				●	

NATIONAL HEART AND LUNG INSTITUTE

I. Mission

The National Heart Act of 1948 and the National Heart, Blood Vessel, Lung and Blood Act of 1972 provide authority for the programs of the Institute, which, in turn, provides leadership for a national program in diseases of the heart, blood vessels, lungs and blood. It plans, conducts, fosters, and supports a coordinated program of research, investigations, clinical trials and demonstrations relating to the causes, prevention, diagnosis, and treatment of heart, blood vessel, lung, and blood diseases. This is accomplished through research performed in its own laboratories and through research grants and contracts made to scientific institutions and individuals. It also provides support for the training and development of new scientists to continue these efforts.

II. General Programs

The National Heart and Lung Institute provides funds for grant mechanisms which are common to the National Institutes of Health in general. These include the Research Grants, Program Projects, Research Career Development Awards, and National Research Service Awards. The following programs are common to the three Divisions of the Institute.

Specialized Centers of Research (SCOR)

The Institute initiated this grant program in 1971 to provide a mechanism for more rapid application of new methodologies for the diagnosis, treatment, and prevention of specific disease problems. It now provides support in 5 areas of research; arteriosclerosis, hypertension, lung diseases, thrombosis, and ischemic heart disease. Grants are awarded to institutions that compete successfully in response to detailed announcements which are published when available funds are anticipated. The Institute assigns a project officer for each area, and the grantees are expected to collaborate with other grantees in the same area of research as well as respond to urgent problems posed by the Institute.

National Research and Demonstration Centers

These centers are envisioned as broad efforts to implement the program of the National Heart and Lung Institute. They should encompass activities in fundamental research, clinical research, demonstrations of innovations in health care delivery, and education projects for both professionals and the lay public. They are not intended to be a direct-service facility for their communities.

Each applicant is expected to propose its own program based upon local resources and interests. It may address any major area of the national program, or a combination of areas if it can be shown that the combination will more effectively meet the goals of the national program.

Announcements of competition for these grants are made when additional funds for the program are anticipated.

III. Special Programs in Blood Diseases and Resources

To complement the traditional grant program, the Division of Blood Disease and Resources provides special programs for collaborative and targeted research. These programs are located in institutions which can provide an excellent forum for interactions, exchange of ideas, and collaborations that would not otherwise exist. This multidisciplinary and multicategorical approach is extended to a number of research areas in blood diseases and blood resources. In blood diseases these areas include the hemophilias, thromboembolic embolism in relation to prosthetic devices, sickle cell disease, and related disorders of the red blood cell. In blood resources they include a nationwide blood system, blood component therapy, blood safety, and transplantation biology.

Blood Resources

This program supports research in blood banking systems management, aimed at improving the operations of blood banking nationwide. Other work supports improved methods of blood fractionation and development of new fractionation products, improved storage of blood and blood products, improved utilization of blood components, and elimination of the hazards of blood transfusion, with special emphasis on the problem of post-transfusion hepatitis. This program includes development of blood substitutes and research in transplantation biology.

Thrombosis

This program has supported development and application of agents that dissolve formed blood clots. Currently, trials have been initiated to test the efficacy of heparin and platelet inhibiting agents to prevent venous thrombosis in high risk groups. Other work involves preparation of highly purified reagents used in coagulation research and studying the relationship between diet, platelet function, and thrombosis.

Hemophilia

This program has supported pilot epidemiologic studies of the hemophiliac popu-

lation and continues to evaluate the availability of treatment facilities and their impact on the national blood resource. Other work supports standardization and improvement of clotting factor preparation necessary for treatment of hemophilia, assessment of the usefulness of highly purified animal clotting factors, development of methodology for identifying the hemophilia carrier, and exploration and evaluation of methods to develop a nationwide study with comprehensive care potential in hemophilia. Studies are envisioned to assess the value of prophylactic and self-treatment with Factor VIII to explore and evaluate genetic counseling techniques in hemophilia.

Biomaterials

This program supports basic and applied investigations to study the interaction between blood components and synthetic materials, as well as naturally occuring macromolecules. The major aim is to understand better what factors are involved in blood compatibility. This is a necessary requirement for the development of improved blood-compatible materials for implantable cardiovascular assist devices, artificial organs, catheters, cannulas, as well as nonimplantable extra-corporeal assist devices, such as blood oxygenators.

Sickle Cell Disease

This program, in cooperation with the Center for Disease Control, supports a proficiency testing program to evaluate laboratory testing procedures for hemoglobinopathies, a basic and advanced laboratory training course for identification of abnormal hemoglobin, and a reference bank of abnormal hemoglobins. Other areas of interest include agents to alter the sickling process and treat the painful "sickle crisis"; new techniques for improving the diagnosis of hemoglobinopathies *in utero*, in cord blood, and in screening clinics; continuing education programs for professional and lay populations; and clinical trials to evaluate methods of managing the iron overload problem in Cooley's anemia. Part of this program is supported by grants for Comprehensive Sickle Cell Disease Centers.

Announcements for Competition for support in these areas are made when funding for these purposes is anticipated.

For further information, write to: Director, Division of Blood Diseases and Resources, National Heart and Lung Institute, Bethesda, Maryland 20014.

IV. Special Programs in Lung Diseases

Pulmonary Academic Award

Awards are made to schools of medicine or osteopathy for the dual purpose of improving the quality of pulmonary curricula and of fostering research and careers in the respiratory field. This program is designed to meet the long-term, rapidly growing need for highly trained researchers, clinicians, and teachers concerned with lung structure and function and lung diseases. Any school of medicine or osteopathy within the United States or its possessions is eligible for this award. Receipt dates for applications are announced annually.

National Pulmonary Faculty Training Program

The National Pulmonary Faculty Training Program is intended to strengthen pulmonary faculties at schools of medicine and osteopathy which have not yet developed adequate programs addressed to respiratory diseases. The program provides support for a training environment at medical centers with strong academic programs (Pulmonary Faculty Training Centers Grants) and for junior faculty from medical schools which wish to strengthen their academic programs (Medical School Pulmonary Faculty Training Awards). The junior faculty members from schools wishing to strengthen their pulmonary academic programs are provided the opportunity to obtain extensive pulmonary training at medical centers where training environment is supported through this program.

Pulmonary Faculty Training Centers

Any domestic university medical school or comparable institution with strong, well-established pulmonary research and training programs and adequate numbers of highly trained faculty in clinical and basic departments relevant to pulmonary disease, may apply for the Pulmonary Faculty Training Center Grant.

Medical School Pulmonary Faculty Training Award

Any domestic school of medicine or osteopathy that has few or no members of its faculty engaged in full-time teaching, research, and clinical care in pulmonary disease and respiratory disorders and has little or no capacity for training young faculty members when successful in recruiting them, is eligible to apply for the Medical School Pulmonary Faculty Training Award.

The Junior Faculty Member participating in this program must be a physician or scientist with a doctoral degree in a health-related field who is a citizen of the United States, a citizen national, or admitted to permanent residence at the time of application (Junior Faculty are sponsored by the School submitting an application for Medical School Pulmonary Faculty

Training Award). Receipt dates for applications are announced by the Division of Lung Disease.

Young Investigator Pulmonary Research Grant

This program is intended to foster the pulmonary research interest of young scientists and physicians by providing them with modest, independent support for a project of their own design. Projects in either fundamental of clinical disciplines must be relevant to problems of pulmonary disease and be completed within a two-year period.

Applicants must be citizens, or non-citizen nationals of the United States or have been lawfully admitted to the United States for permanent residence, must hold a doctorate in a field relevant to the purpose of this grant, and must be below age 35 when the application is received by the National Institutes of Health.

Grants will not be available to anyone who is a principal investigator on NIH-supported centers, program projects, regular research grants or contracts or has been the recipient of an NIH Special Research Fellowship or Research Career Development Award.

For further information on special programs in lung disease, write to: Director, Division of Lung Diseases, National Heart and Lung Institute, National Institutes of Health, Bethesda, Maryland 20014.

V. Special Programs in Heart and Vascular Diseases

National High Blood Pressure Education Research Program

A program announcement has been issued for a grant-supported program in high blood pressure education research. This represents the second announcement for the Program, which was initiated in 1973. The goal is to achieve a better understanding of the characteristics of an individual that may relate to health maintenance behavior (specifically, adherence to medical regimens prescribed for hypertensive patients); and educational interventions that will enhance a patient's initial and long-term adherence to hypertensive therapy. It is expected that the results of this Program will provide health-care practitioners with instruments and techniques for identifying in hypertensives a constellation of selected characteristics having a demonstrated relation to measure of adherence behavior; and educational materials and techniques which have been proven to affect individual characteristics related to adherence, have resulted in enhanced adherence, and have been correlated with presenting characteristics of experimental groups of hypertensive patients.

Announcements for competition are made when dictated by program needs and available funds.

Nonhuman Primate Models of Arteriosclerosis, Hypertension, or Dyslipoproteinemia

A program is now under way for the preparation, supply, and limited study of chronic experimental models of arteriosclerosis, hypertension, and cerebrovascular disease in selected species of nonhuman primates. The program covers breeding, supply, and study of normal, spontaneously dyslipoproteinemic or hypertensive animals, and or other prepared models. It is expected that the program will facilitate research into the chronic development and regression of lesions and the pathophysiology of these diseases by supplying resources of appropriate models of nonhuman primates. Projected activities under this program include: screening for spontaneous diseases of interest; study and specialized breeding for such defects; inducing chronic disease experimentally; and breeding selectively animals that respond in predictable ways to experimental challenges.

Announcements for competition in this program depend upon program needs and available funds.

Ischemic Heart Disease

The program objectives are to plan and support research leading to a reduction of death or disability from acute myocardial infarction, chronic coronary heart disease, and sudden cardiac death. It includes investigations on disease detection, pathophysiological mechanisms, and prophylactic, acute, and rehabilitative therapy.

A program of research on sudden cardiac death and the onset of myocardial infarction was initiated in 1970 and expanded in 1971. It includes prophylactic and early therapeutic techniques, investigation of pathophysiological mechanisms and possible precipitating factors, the recognition of high-risk individuals, and laboratory and clinical investigations fundamental to these objectives. A closely related program on experimental interventions and basic studies or the control of lethal arrhythmias associated with coronary heart disease began in 1972.

Physiological and biochemical processes which may lead to new therapeutic methods are under investigation. A dozen projects, initiated in 1971 and 1972, are focused upon

characterizing these processes in ischemic myocardium and designing interventions to prevent the progression of ischemia to irreversible damage. A program of research to develop techniques suitable for quantifying the size of infarcted or ischemic myocardium for use in living man is also under way.

Future announcements of competition in these programs will depend upon program needs and available funds.

Artificial Heart and Cardiovascular Devices

The goals of the program are to reduce death and disability from cardiovascular diseases through the development of therapeutic and diagnostic devices and instrumentation. At present the major effort is the development of circulatory assist and cardiac replacement devices. This involves not only the development and assessment of pumps; energy systems; control systems; and materials; but also necessary physiological assessments and evaluation of reliability. Diagnostic devices of particular interest will likely enable detection and quantification of arteriosclerotic lesions. There is an existing program in flow and pressure movement and cardiovascular imaging devices.

For further information on special programs in heart and vascular diseases, write to: Director, Division of Heart and Vascular Diseases, National Heart and Lung Institute, National Institutes of Health, Bethesda, Maryland 20014.

NHLI Programs and Awards

	Research Project Grants	Specialized Centers	National Research and Demonstration Centers	Research Career Development Awards	Academic Awards	Young Investigator Research Grants	National Research Service Awards	Research and Development Contracts	Minority Institution Grants	Prevention, Control and Education Grants and Contracts
Blood Diseases and Resources								●		●
Thrombosis	●	●		●			●	●		
Hemorrhagic Diseases	●			●			●	●		
Biomaterials	●							●		
Red Blood Cell Disorders	●			●			●	●	●	
Sickle Cell Disease	●	●		●			●	●		
National Blood System and Safety	●		●					●		
Component Therapy, Artificial Blood, and Transplantation Biology	●							●		
Lung Diseases								●	●	
Pathophysiology	●							●		
Etiology	●							●		
Special Programs and Resources	●			●	●	●	●	●		
Centers and Control Programs		●	●							●
Heart and Vascular Diseases			●							
Manpower				●			●			
Prevention, Control, and Education Program										●
National High Blood Pressure Program										●
Lipid Metabolism								●		
Atherogenesis	●	●						●		
Hypertension	●	●						●		●
Clinical Cardiac Diseases	●	●						●		
Cardiac Functions	●									
Cardiovascular Devices	●							●		
Preventive Cardiology								●		●
Clinical Trials	●							●		
Epidemiology								●		

NATIONAL INSTITUTE OF NEUROLOGICAL AND COMMUNICATIVE DISORDERS AND STROKE

The Mission

The research and training grant and contract programs of NINCDS are focused on the identification, stimulation, and support of essential research activities aimed at the improved diagnosis, treatment and prevention of disorders of the nervous system, the neuromuscular apparatus, the ear, human communication, and the special senses of taste, smell, touch and pain. They include disorders of the young (cerebral palsy, epilepsy, learning disabilities), of adulthood (head and spinal cord injury, multiple sclerosis, communicative disorders, brain tumors), and of the aged (stroke, parkinsonism, otosclerosis). It should be emphasized that in no other area of health-related research are fundamental investigations of greater importance. Since all nerve cells presumably work basically in the same way, more information on synapses, neurotransmitters, and the nerve membrane is urgently needed.

Programs

The Extramural Activities of NINCDS are divided into four major programs as shown in the attached Tables and as indicated below.

Communicative Disorders

Include research on all aspects of speech, hearing, equilibrium and the special senses. Some of the main areas are anatomical, physiological, biochemical, behavioral and pathological studies; and clinical studies of deafness, auditory impairments of old age and in the very young, treatment, and rehabilitation. Area of speech includes sound reduction, modulation and projection, speech pathology, and aphasia. Also included are basic science and clinical studies of the special senses: taste, smell, touch and pain. Outpatient Clinical Research Centers are supported for clinical studies on speech and hearing.

Stroke and Nervous System Trauma

Consists of three main areas: stroke, head injury, spinal cord injury; and two additional areas: growth and regeneration, and neoplastic disorders. Research on stroke includes all aspects of cerebrovascular disorders such as pathogenesis, incidence, prevalence, epidemiology, prevention, diagnosis, and therapy. In the case of head and spinal cord injury, emphasis is on the acute phase of the injury. Special Clinical Research Centers are supported in these areas.

The ultimate goal of research on growth and regeneration of nerve cell is the repair of transected parts of the nervous system and of regions damaged by stroke, epilepsy, etc. Any research in this area is applicable. A particularly important problem at the moment is the formation of functional synapses by regenerating cells. While much work on brain tumors is supported by the National Cancer Institute, NINCDS is especially interested in research on brain tumors that show characteristics or specialized neurological effects.

Neurological Disorders

Include principally cerebral palsy, genetic disorders, epilepsy, multiple sclerosis, parkinsonism and muscular dystrophy. Research on any aspect of these and other related disorders is applicable. Presently there are Clinical Research Centers in epilepsy, multiple sclerosis, parkinsonism and neuromuscular disorders.

Fundamental Neurosciences

Include mainly those aspects related to nerve structure and function (membranes, synapses, neurotransmitters) and the basic disciplines (neuroanatomy, neurobiology, etc.) Also included is work on the development of various types of prostheses and behavioral studies related to sensory deprivation, the limbic system and central processing.

Minority Institution Grants

Are available in all research programs.

Mechanisms of Award

The general characteristics of the various NIH award mechanisms have been described in the first part of this booklet. Therefore, only certain NINCDS conditions will be highlighted here. The program areas in which the various award mechanisms are available are shown in the attached Tables.

Research Project Grants

For investigator-initiated projects under the supervision of one or two investigators, focused on the specific, well circumscribed problem, are available in all areas.

Program Project Grants

Support of multidisciplinary approach to a basic area of neurological or communicative science research (neuropharmacology, nerve regeneration, neurophysiology, etc.), to be carried out by a group of established investigators, usually crossing departmental lines.

Research Career Development Awards

Provide additional research training and experience for a career in independent research in the neurological and communicative sci-

ences. Awards are available in any research area.

Teacher-Investigator Awards

Prepare future teacher-investigators of the highest caliber for careers in the clinical research disciplines of areas of the neurological and communicative disorders such as neurology, neurosurgery, neuropathology, otopathology, otolaryngology, and speech pathology. Candidates must be nominated by a nonprofit institution and must have at least three, but no more than six years of postdoctoral training and/or experience. Awards offer an opportunity for five years of special study or experience tailored to the candidate's individual needs.

Individual National Research Service Awards

Provide one to three years of postdoctoral research training in the following investigative areas:

Audiology
Clinical Investigation
Developmental Neurology
Neuroanatomy
Neurobiology
Neurochemistry
Neuroimmunology
Neuropathology and/or Otopathology
Neuropharmacology
Neurophysiology
Neuroradiology
Neurovirology
Sensory Physiology and Biophysics
Speech Pathology

Clinical Research Centers

Support broad clinical research programs, which may include basic research. These provide for a multifaceted or multidisciplinary research program organized around a single disease or a group of related disease entities. Clinical research centers are presently funded in areas of parkinsonism, stroke, head injury, spinal cord injury, epilepsy, neuromuscular disorders, multiple sclerosis and communicative disorders.

Stroke Acute Care Research Units

Are available to medical and osteopathic colleges with responsibilities for cerebrovascular clinical research and graduate teaching to develop institutional focal points for (1) increased attention to develop or improve methods of prevention, diagnosis and treatment of the acute stroke, (2) development and evaluation of treatment methods, and (3) related training of professional and scientific personnel in this area. Awards may not exceed $75,000 per year for three years, and are renewable.

Outpatient Clinical Research Centers

Assist in the establishment, improvement, and support of a stable outpatient research environment for clinical studies on an ambulatory population on which specific projects in a disorder area (deafness, stroke, epilepsy, aphasia) are to be conducted. Funds are provided for the research staff, clinical research equipment, examination and follow-up research patients, and retrieval and analysis of research patient records. These awards are made in any clinical research area and they are particularly suitable for clinical research in speech and hearing where the patients usually are ambulatory.

Minority Institution Grants

Applications for regular research grants are invited from investigators at minority institutions. Support may be requested in any research area and for basic and/or clinical research.

Research and Development Contracts

The NINCDS identifies specific research areas within its sphere of interest, which are not receiving sufficient investigative attention to allow the development of knowledge required for the prevention or cure of neurological and communicative diseases and disabilities of major concern to the public. It is not always possible for the Institute, using its own resources exclusively, to mount a complete research program to promote the acquisition of knowledge in the required areas. In such situations the NINCDS relies upon negotiated contracts to procure the required research or development.

R&D Service and Procurement Contracts

Are used to provide materials or services specifically desired by the Institute. Contracts may be used also to obtain services ranging from printing to pathological or immunological services that are not available at NINCDS.

Additional Information—May be obtained from the sources listed below:

Research Grants: Deputy Director, Extramural Program, NINCDS-NIH, Westwood Building, Room 7A18, Bethesda, Maryland 20014

Research and Development Contracts: Head, Research Contracts Section, Collaborative & Field Research, NINCDS-NIH, Federal Building, Room 704, Bethesda, Maryland 20014

All Other Awards—(Program projects, centers, fellowships, training): Chief, Special Programs Branch, NINCDS-NIH, Westwood Building, Room 7A18B, Bethesda, Maryland 20014

NINCDS Programs and Awards

	Research Project Grants	Program Project Grants	Research Career Development Awards	*Teacher-Investigator	Individual National Research Service Awards	Institutional Grants for National Research Service Awards	Specialized Centers	Outpatient Clinical Centers	Minority Grants	Research and Development Contracts
Stroke and Nervous System Trauma										
Stroke										
Pathophysiology							●			
Diagnosis and Treatment	●		●	●	●	●			●	●
Clinical Trials	●		●	●					●	●
Headache	●		●	●	●				●	●
Head Injury	●		●	●	●				●	●
Pathophysiology	●		●	●	●	●			●	●
Diagnosis and Treatment	●		●	●	●				●	●
Clinical Trials	●		●	●	●				●	●
Radiation	●		●	●	●				●	●
Spinal Cord Injury										
Pathophysiology	●		●	●	●	●			●	●
Diagnosis and Treatment	●		●	●	●				●	●
Clinical Trials	●		●	●	●				●	●
Manipulative Therapy	●		●	●	●				●	●
Growth and Regeneration	●	●	●		●				●	●
Neoplastic Disorders										
Primary	●		●	●	●				●	●
Metastatic	●		●	●	●				●	●
Clinical Trials	●		●	●	●				●	●
Basic Studies	●	●	●		●				●	
Communicative Disorders										
Hearing										
Audiology	●	●	●	●	●		●	●	●	●
Clinical Investigation	●	●	●	●	●		●	●	●	●
Otopathology	●	●	●	●	●	●	●	●	●	●
Sensory Physiology and Biophysics	●	●	●	●	●	●	●	●	●	
Pathophysiology	●	●	●	●		●	●	●	●	●
Diagnostic Methods	●	●	●	●			●	●	●	●
Middle Ear Disorders	●	●	●	●			●	●	●	●
Inner Ear Disorders	●	●	●	●			●	●	●	●
Noise	●	●	●	●			●	●	●	●

	Research Project Grants	Program Project Grants	Research Career Development Awards	*Teacher-Investigator	Individual National Research Service Awards	Institutional Grants for National Research Service Awards	Specialized Centers	Outpatient Clinical Centers	Minority Grants	Research and Development Contracts
Speech										
Development	●	●	●	●			●	●	●	●
Pathophysiology	●	●	●	●	●		●	●	●	●
Therapy	●	●	●	●			●	●	●	●
Laryngeal Disorders	●	●	●	●			●	●	●	●
Language										
Development	●	●	●	●			●	●	●	●
Central Processing	●	●	●	●			●	●	●	●
Aphasia	●	●	●	●			●	●	●	●
Equilibrium										
Cortical Mechanisms	●	●	●	●			●	●	●	●
Vestibular Mechanisms	●	●	●	●			●	●	●	●
Special Senses										
Taste	●	●	●				●		●	●
Pain	●	●	●				●		●	●
Smell	●	●	●				●		●	●
Perception	●	●	●				●		●	●
Basic Studies	●	●	●		●				●	
Neurological Disorders										
Developmental Disorders										
Cerebral Palsy	●	●	●	●	●	●	●		●	●
Mental Retardation	●	●	●	●	●	●	●		●	●
Metabolic Disorders	●	●	●	●	●	●	●		●	●
Genetic Disorders	●	●	●	●	●	●	●		●	●
Behavioral Disorders (e.g. autism)	●	●	●	●	●	●	●	●	●	●
Learning Disorders (e.g. dyslexia)	●	●	●	●	●	●	●	●	●	●
Convulsive Disorders										
Epilepsy	●		●	●	●		●	●	●	●
Centers							●		●	●
Sleep Disorders	●		●	●	●		●	●	●	●
Demyelinating Disorders										
Multiple Sclerosis	●		●	●	●		●		●	●

*Only in clinical areas—applies also in the following tables.

NINCDS Programs and Awards

	Research Project Grants	Program Project Grants	Research Career Development Awards	*Teacher-Investigator	Individual National Research Service Awards	Institutional Grants for National Research Service Awards	Specialized Centers	Outpatient Clinical Centers	Minority Grants	Research and Development Contracts
Amyotrophic Lateral Sclerosis	●		●	●	●		●		●	●
Allergic and Infectious Disorders (EAE)	●	●	●	●			●		●	●
Degenerative Disorders										
Parkinsonism	●		●	●	●		●		●	●
Aging	●	●	●	●	●		●		●	●
Organic Dementias	●	●	●	●	●		●		●	●
Memory Disorders	●	●	●	●	●		●		●	●
Muscular, Neuromuscular Disorders										
Muscular Dystrophies	●	●	●	●	●		●		●	●
Myasthenia Gravis	●	●	●	●	●		●		●	●
Peripheral Neuropathies	●	●	●	●	●				●	●
Infectious Disorders										
Encephalopathies	●	●	●	●	●		●		●	●
Memingitides	●	●	●	●	●		●		●	●
Focal Infections	●	●	●	●	●				●	●
Basic Studies	●	●	●		●					
Fundamental Neurosceinces										
Bioengineering										
Neural and Sensory Prostheses	●	●	●		●		●		●	●
Medical Instrumentation	●		●						●	●
Structure and Function										
Membranes	●	●	●		●	●			●	●
Receptors	●	●	●		●	●			●	●
Neurotransmitters	●	●	●		●	●			●	●
Axon Flow and Metabolism	●	●	●		●	●			●	●
Neurotoxins	●	●	●		●	●			●	●

	Research Project Grants	Program Project Grants	Research Career Development Awards	*Teacher-Investigator	Individual National Research Service Awards	Institutional Grants for National Research Service Awards	Specialized Centers	Outpatient Clinical Centers	Minority Grants	Research and Development Contracts
Behavior										
Sensory Deprivation	●	●	●	●			●		●	●
Limbic System	●	●	●	●			●		●	●
Central Processing	●	●	●	●			●		●	●
Fundamental Studies										
Neuroanatomy	●	●	●		●				●	●
Neurobiology	●	●	●		●				●	●
Neurochemistry	●	●	●		●				●	●
Neuropharmacology	●	●	●		●				●	●
Neurophysiology	●	●	●		●				●	●
Neuroradiolobiology	●	●	●		●				●	●

*Only in clinical areas—applies also in the following tables.

DIVISION OF RESEARCH RESOURCES

I. Mission

To identify and meet the research resource needs and opportunities of the NIH by conceiving, creating, developing and insuring the availability of those resources that are essential for the efficient and effective conduct of human health research.

Division of Research Resources programs are institutional in nature. Generally, support is through resource grant mechanisms.

II. Programs.

1. Animal Resources

A. Primate Research Centers Programs

The Program is designed to provide for and conduct medical research utilizing a large number and variety of nonhuman primate subjects. Its primary purpose is to develop primate models of human disease conditions, and to offer training and expertise in primatology as related to medical research.

Seven grant-supported primate research centers are strategically located throughout the country. These centers are collectively concerned with more than 500 different research projects on physiology, behavior, and disease.

B. Laboratory Animal Sciences Program

This program was established to help research institutions meet their need for higher quality specialized research animals, improved care of animals, and better definition of animals as biomedical models.

These grants support such activities as:

- developing and maintaining colonies of special research animals;
- developing and defining new animal biological models;
- developing and improving institutional animal resources, including projects to meet the requirements of the Animal Welfare Act of 1970 and NIH policies on the care and use of laboratory animals;
- developing and maintaining laboratory animal disease diagnostic laboratories, including those assuming a regional responsibility;
- investigations for improving the health and well-being of research animals, including environmental technology; and projects for gathering and disseminating information on research animals, laboratory animal medicine, and technology.

Nonprofit institutions engaged in health-related research who wish to undertake an animal research project may apply. Grants are made to support a resource for an institution or major division within an institution. An institution may elect to provide an animal resource activity for several cooperating institutions in its region.

C. Individual National Research Service Awards
Grants for Institutional National Research Service Awards
Research Career Development Awards

1. Individual National Research Service Awards in laboratory animal science are given directly to individuals for advanced research training.

Fellowship candidates must have earned a DVM, MD. Ph.D., or equivalent degree. Fellowships are not awarded for study leading to a professional degree, such as DVM, MD, OR DDS. To be eligible, one must be a citizen or non-citizen national of the United States, or have been lawfully admitted to the United States for permanent residency.

2. Institutional Grants for National Research Service Awards are awarded to institutions offering training opportunities in laboratory animal medicine and science at the postdoctoral level.

3. Research Career Development Awards are made to develop the potential of individuals to do animal resource-related research. Additional training and experience will be provided for individuals in preparation for independent research. The award is limited to a single support period of five years. The maximum NIH contribution to the salary is $25,000 per year.

Institutions may apply for awards on behalf of individuals who have had three or more years relevant postdoctoral experience. The candidate must be a citizen or national of the United States, or have been lawfully admitted as a permanent resident.

For further information on Animal Resources programs, please contact: Animal Resources Program, Division of Research Resources, National Institutes of Health, Bethesda, Maryland 20014

2. Biotechnical Resources Program

Biotechnology resource grant awards provide U.S. life scientists with sophisticated tools for research, education, and patient care. These include facilities for computing and data processing, high voltage electronic microscopy, mass spectroscopy and nuclear magnetic resonance spectroscopy, and other specialized techniques. Biotechnology grants

and contracts are awarded for large-scale resources, such as computer centers that are made available to investigators in an entire institution or region. Special emphasis is placed on national shareable resources. The program does not provide for research or training that can be obtained otherwise through the NIH programs.

Universities, hospitals, and other institutions with programs of biomedical research and/or specialized technological capabilities related thereto are eligible to apply.

For further program information, please contact: Biotechnology Resources Program, Division of Research Resources, National Institutes of Health, Bethesda, Maryland 20014

3. General Clinical Research Centers Program

General clinical research center grant awards provide institutional clinical research resources for investigators in widely scattered geographic locations. The primary goal of the GCRC program is to establish a research resource to be used in the clinical investigation of human health problems in order to increase the total body of knowledge of the etiology, progression, prevention, control, and cure of human disease. To meet this goal, certain objectives have been established, i.e., to establish resources to:

- provide an optimal setting for the performance of controlled studies by clinical investigators supported through NIH and other research supported programs;
- encourage and foster interaction among research disciplines;
- contribute to the maintenance of a national core of qualified clinical investigators; and
- develop technological and therapeutic advances to ensure the expeditious translation of fundamental biological knowledge into effective patient care.

A General Clinical Research Center is a discrete ward of from 4 to 30 beds, located in hospitals where scientists from many departments correlate their laboratory studies with carefully controlled clinical observations and analyses. Each unit has its own paramedical staff, laboratories, diet kitchen, and nursing personnel. Projects of investigators proposing to use a center are reviewed for scientific merit by an institutional advisory committee and also by a special committee responsible for compliance with Federal policy on the rights of human beings as research subjects. Grantees receive financial support for personnel (professional, secretarial, dietary, laboratory, and nursing), supplies, travel, equipment, hospitalization and renovation costs.

Medical schools, medical school-affiliated hospitals, and other nonprofit medical institutions capable of conducting well-designed studies involving human patients are eligible to apply.

For further program information, please contact: General Clinical Research Centers Program, Division of Research Resources, National Institutes of Health, Bethesda, Maryland 20014

4. Biomedical Research Support Programs

A. Biomedical Research Support Grants

Biomedical Research Support Grants are made to eligible institutions within the United States or its territories for research in the sciences related to health. These awards are intended to complement other forms of grant-in-aid for biomedical and behavioral research, so as to enhance the effectiveness and efficiency of that research. Support from this program provides the opportunity for grantee institutions to exercise on-site judgment regarding emphasis, specific direction, and content of activities supported, thus enabling the institution to respond quickly and effectively to emerging opportunities and unpredictable requirements, to enhance creativity, to encourage innovation, to provide for pilot studies, and to improve research resources, both physical and human.

Biomedical Research Support Grants are awarded to health professional schools of medicine, dentistry, osteopathy, public health, pharmacy, allied health, and veterinary medicine, and to other academic institutions, hospitals, nonacademic research organizations, and State or local health departments.

Grantee institutions must have been awarded a minimum of $200,000 in NIH/NIMH research project grants during the preceding fiscal year. Other criteria, including the total health sciences research activities of the institution, the complexity of the various projects and programs being conducted, and the problems of integrating these programs, are taken into account.

B. Biomedical Research Development Grants

The purpose of the Biomedical Research Development Grant Program will be to enhance the achievement of the Federal commitment to discovery of new knowledge necessary for better health through research contributions from a broader array of institutions. The program is intended for those institutions that currently have limited involvement in biomedical and behavioral research, but possess the necessary

potential and can justify such research advancement in terms of the national interest and the NIH mission.

Biomedical Research Development Grants are awarded to the same categories of institutions that are served by the Biomedical Research Support Grant Program. Eligible institutions will be those which receive less than $200,000 of direct and indirect costs annually in PHS biomedical and behavioral research grant support as required for the proposed BRSG Program.

For further information on the Biomedical Research Support programs, please contact: Biomedical Research Support Programs, Division of Research Resources, National Institutes of Health, Bethesda, Maryland 20014

5. Minority Biomedical Support Program

Minority Biomedical Support grants are intended to strengthen the institutional research capability of colleges and universities in which there are significant student enrollments from ethnic minority groups, such as Blacks, Spanish-speaking, American Indians, Asians and Polynesians. Awards are made to eligible institutions, some of which do not presently have much involvement in biomedical research, but have the potential on which to build biomedical research and research training.

By offering the eligible institutions diverse opportunities to involve faculty and students in these areas, minority biomedical support grants provide minority students with a broader base of preparation for research careers in the biomedical sciences, and enable the development of new strengths in the sciences in these schools.

Minority biomedical support grants may be used to support:

- released time for faculty members to engage in research and research training;
- exploratory research and full-scale research and research training activities through the purchase of equipment, supplies, technical assistance, etc., as needed;
- undergraduate and graduate students in research participation through their involvement in a faculty members' research; and
- resources such as the operation of central research resources not related solely to any one specific project or program, but essential to the entire biomedical research activity of the institutions; or the provision of ancillary research services, such as machine shops or central laboratories.

To be eligible for a grant under this Program, an applicant must be one of the following:

(1) A public or private nonprofit university, four-year college, or other institution offering undergraduate, graduate, or health professional degrees, with a significant student enrollment (but not necessarily more than 50 percent) which is derived from ethnic minorities.

(2) Two-year colleges with a traditionally high (more than 50 percent) minority student enrollment.

(3) An Indian tribe which has a recongized governing body and which performs substantially government functions, or an Alaska Regional Corporation as defined in the Alaska Native Claims Settlement Act. The applicant also must be located in a State, the District of Columbia, Puerto Rico, the Virgin Islands, the Canal Zone, Guam, American Samoa, or the Trust Territory of the Pacific Islands.

For further program information, please contact: Minority Biomedical Support Program, Division of Research Resources, National Institutes of Health, Bethesda, Maryland 20014

DRR Programs and Awards

	Resources Grants	National Research Service Awards	Research and Development Contracts
Biomedical Research Support	●		
Minority Biomedical Support	●		
Clinical Research	●		●
Biotechnology Research	●		●
Laboratory Animal Sciences and Primate Research	●	●	●
Chemical Biological Information			●

NATIONAL LIBRARY OF MEDICINE

The Health Services Research, Health Statistics, and Medical Libraries Act of 1974 (sections 390–399), authorizes a number of National Library of Medicine programs leading to better access and utilization of health information. The programs assist the health community to find ways for more rapid and widespread communication of biomedical information.

In general, the mechanism of assistance is the grant-in-aid, usually applied for on standard form NIH 398. The usual NIH practices of peer review and grant administration apply generally to NLM programs.

A. Research, Development and Demonstration

The program provides grant support for basic research, technical development, and demonstration of health information projects in the health library science, information science and services, health education and knowledge transfer, and history of medicine.

B. Special Scientific Projects

To cope with the ever increasing volume and complexity of health literature, grants are offered to eminent health scientists or practitioners for developing major scholarly works which interpret or synthesize broad topics of health interest. The grants provide up to full time personal support as well as related expenses. The grants are usually for one year, with the expectation that a book-length manuscript will be submitted to a reputable scientific publisher.

C. Training in Computer Technology

Training program grants are currently awarded to institutions for introducing clinical educators or potential clinical educators to the computer technology and related information sciences. The grants provide stipends, tuition, materials, and support for related program expenses. Applicants should have strong computer resources in their institutions. The standard NIH training form, review procedures, and administrative policies apply.

D. Medical Library Resources

Resource project grants give support to medical libraries, enabling them to enhance, expand, and develop information services. Grants are awarded to institutions with health libraries, and the librarian is the project director. Applications are submitted on form NIH 398, with special instructions available from NLM.

This program also awards medical library Improvement Grants. These are small grants made to medical libraries in health institutions, such as community hospitals. The amounts are related to specific categories, such as books and journals. Form NIH 1887 is issued, and applications may be submitted at any time.

E. Regional Medical Library

NLM awards contracts to ten regional medical libraries where a variety of services are coordinated to serve a major geographic region. No additional regional medical libraries are contemplated at present. A major goal of the RML system is to utilize and build upon existing health institutions and networks for improved information access.

F. Biomedical Publications

Grants are awarded to support nonprofit biomedical scientific publications, and the compilation, writing, editing and publication of "secondary" information tools such as reviews, abstracts, translations, indexes, handbooks, bibliographies, and related materials pertaining to biomedical sciences. The grants permit the selective funding of necessary costs for preparing and publishing resources that condense, synthesize, evaluate, and repackage information for the health community.

For further information contact the Associate Director for Extramural Programs, National Library of Medicine, 8600 Rockville Pike, Bethesda, Maryland 20014.

FOGARTY INTERNATIONAL CENTER FOR ADVANCED STUDY IN THE HEALTH SCIENCES

With no categorical disease responsibility, the Center addresses itself to programs related to all of the Institutes of NIH and focuses attention on international cooperation. The Center offers fellowships under three categories, which include:

(a) Fogarty Scholars-in-Residence Program—This is a senior-type program, which is by invitation and involves relatively senior biomedically oriented individuals who spend from three to twelve months in residence at the NIH. The participants relate to staff of all NIH Institutes and Research Divisions, as well as to outside academic institutions.

(b) The Senior International Fellowship Program—This program is designed to provide opportunities to outstanding faculty members at mid-career from U.S. schools of medicine, osteopathy, dentistry and public health, with demonstrated productive scholarship and recognized stature in their professions, to go abroad to study and share their expertise. This award is intended to be a career-enhancing educational experience with mutual benefits to all involved.

The nomination of an individual for this fellowship will be made by the U.S. institution. The application requires the endorsement of the president or other appropriate official of the nominating institution, and shall specify the expected benefits of the institution from the applicant's proposed program. A letter of invitation is required from an appropriate individual at the host institution abroad, attesting to the willingness of the institution to sponsor the applicant and outlining any benefits which may accrue.

To be eligible the nominee must be a U.S. citizen, hold a full-time appointment on the staff of the nominating institution, have at least five years' experience beyond the doctorate or professional medical degree in research, teaching or other relevant professional work, and possess the linguistic abilities necessary for learning and for profitable discussion with colleagues in the country proposed for training. Stipends will be determined individually by the staff of the Center, based upon such factors such as current salary and any proposed financial contributions and participation by the nominating institution. A maximum NIH contribution to salary will be $25,000 for any twelve-month period.

(c) International Fellowship Program—This program offers fellowships to outstanding and relatively young biomedical scientists (within ten years of their doctorate) from thirty-four participating foreign countries. Each country has a nominating committee made up of outstanding senior biomedical scientists who screen and recommend candidates from their respective countries. These individuals compete internationally for the available funds, and each year approximately seventy-five new awards are made. The recipients of these fellowships come to U.S. laboratories under the sponsorship of a preceptor who provides the necessary laboratory space for the individual's research experience.

Eligibility for this program requires that the individual be a citizen of the participating country, that he hold a doctorate degree or equivalent, and that he submit a proposed plan of research and arrange for a sponsor who is a senior scientist in a U.S. laboratory. This program has been functional since FY 1958 and has involved more than 1500 participants, many of whom have made outstanding contributions to advancing health sciences.

Inquiries on both the Senior International Fellowship Program and the International Fellowship Program should be directed to Assistant Chief, Scholars and Fellowships Program Branch, Fogarty International Center, National Institutes of Health, Bethesda, Maryland 20014

Application forms for the Senior Program are available from the Office of Research Manpower, Division of Research Grants, National Institutes of Health, Bethesda, Maryland 20014, on request by the Dean or other official at the academic institution.

DISCRIMINATION PROHIBITED—Title VI of the Civil Rights Act of 1964 states: "No person in the United States shall, on the ground of race, color, sex, age, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance." Therefore, activities of the National Institutes of Health, like every program or activity receiving financial assistance from the Department of Health, Education, and Welfare, must be operated in compliance with this law.

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